Aug. 1900
S-Y
64.5

THE

TRANSACTIONS

OF THE

YORKSHIRE NATURALISTS' UNION.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

PART 20.

Issued to the Members for the year 1894.

CONTENTS.

Series D—ARTICULATA—Vol. I., Sheet 10.

Report on Lepidoptera for 1891, by A. E. HALL, F.E.S., pp. 141—156.

Series D—ARTICULATA—Vol. III., Sheets 5, 6.

List of the Coleoptera of Yorkshire, by REV. W. C. HEY, M.A. STAPHYLINIDÆ (concluded), pp. 65—96.

Series E—BOTANY—Vol. IV., Sheet 1.

The Study of Mosses (being the Presidential Address for 1895), by ROBERT BRAITHWAITE, M.D., F.L.S., F.R.M.S.

Appendix—METEOROLOGY—(ten sheets).

Meteorology of Bradford for 1891, 1892, 1893, 1894, and 1895.
By JOHN MCLANDSBOROUGH, F.R.A.S., F.R.Met.S., F.G.S., and ALFRED ELEY PRESTON, M.Inst.C.E., F.R.Met.S., F.G.S. (presented by the authors).

Appendix—REPRINTS of EXCURSION CIRCULARS.

96th Meeting—Horton-in-Ribblesdale, 14th May, 1892.
97th Meeting—Rokeby, 6th June, 1892.
98th Meeting—Penistone, 9th July, 1892.
99th Meeting—Withernsea, 1st Aug., 1892.
100th Meeting—Coxwold, 15th Sept., 1892.
102nd Meeting—Aysgarth, 22nd May, 1893.
103rd Meeting—Askern, 15th June, 1893.
104th Meeting—Kirkbymoorside, 10th July, 1893.
105th Meeting—Sawley Abbey, 7th Aug., 1893.
106th Meeting—Pocklington, 7th Sept., 1893.
108th Meeting—Sedbergh, 14th May, 1894.
109th Meeting—Ferrybridge, 16th June, 1894.
110th Meeting—Knaresborough, 14th July, 1894.
111th Meeting—South Cave, 6th Aug., 1894.
112th Meeting—Mulgrave Woods, 3rd Sept., 1894.
114th Meeting—Hole of Horcum, 13 May, 1895.
115th Meeting—Broughton and Twigmoor, 3rd June, 1895.
116th Meeting—Flamborough, 29th June, 1895.
117th Meeting—Richmond, 5th Aug., 1895.
118th Meeting—Troller's Gill, 7th Sept., 1895.
119th Meeting—Huddersfield Fungus Foray, 7th—10th Sept., 1895.
120th Meeting—Filey Brigg, 21st Sept., 1895.
122nd Meeting—Hackfall and Tanfield, 18th April, 1896.
123rd Meeting—Bowland, 26th May, 1896.
124th Meeting—Skipwith Common, 20th June, 1896.
125th Meeting—Roche Abbey, July 11th, 1896.
126th Meeting—Staithes, 3rd Aug., 1896.
127th Meeting—Selby, Fungus Foray, 19th—22nd Sept., 1896.

Appendix—30th, 32nd, and 33rd ANNUAL REPORTS, PROCEEDINGS of 32nd ANNUAL MEETING, and LISTS OF MEMBERS for 1892 and 1894.

LEEDS: TAYLOR BROS., PRINTERS, SOVEREIGN STREET.

NOVEMBER, 1896.

YORKSHIRE LEPIDOPTERA IN 1891:

BEING

THE REPORT OF THE ENTOMOLOGICAL SECTION

OF THE

YORKSHIRE NATURALISTS' UNION, 1891.

A. E. HALL, F.E.S.,

HON. SEC.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

YORKSHIRE LEPIDOPTERA IN 1891:

Being the Report of the Entomological Section of the Yorkshire Naturalists' Union, 1891.

A. E. HALL, F.E.S., HON. SEC.

The year, on the whole, appears to have been a fairly good one for lepidoptera. The York collectors have had a red letter season, while in the neighbourhood of Rotherham and Sheffield it has been poorer than usual.

In response to seventy-five circulars which I sent to all the lepidopterists of Yorkshire whose names and addresses I could discover, the following were kind enough to send me lists of their captures during the past season :—

(W.B.B.)	Barber, Wm. B.	Sheffield.
(R.H.B.)	Barker, R. H.	Scarborough.
(James B.)	Batty, James	Sheffield.
(E.G.B.)	Bayford, E. G.	Barnsley.
(J.B.)	Bloar, James...	Rotherham.
(J.W.B.)	Boult, J. W.	Hull.
(W.E.B.)	Brady, W. E....	Barnsley.
(W.D.B.)	Braithwaite, W. D. ...	Ackworth.
(Dr. B.)	Burman, Dr.	Wath-upon-Dearne.
(E.P.B.)	Butterfield, E. P. P. ...	Wilsden.
(H.H.C.)	Corbett, H. H.	Doncaster.
(R.D.)	Dutton, R.	York.
*(W.F.)	Farren, Wm.	Cambridge.
(G.F.H.)	Harding, G. F.	Halifax.
(J.H.)	Harrison, John	Barnsley.
(W.H.)	Hewett, Wm.	York.

* Mr. Farren collected at Scarborough, and kindly sent me list of his captures.

(T.A.L.)	Lofthouse, T. A.	Middlesbrough.
(W.M.)	Mansbridge, W.	Horsforth.
(W.N.)	Newman, Wm.	Darlington.
(A.P.)	Paterson, A.	Doncaster.
(G.T.P.)	Porritt, G. T.	Huddersfield.
(J.H.R.)	Rowntree, J. H.	Scarborough.
(M.L.T.)	Thompson, M. L.	Saltburn-by-the-Sea.
(J.N.Y.)	Young, J. N.	Rotherham.

The task of sorting out and arranging the subjoined list has, therefore, not been a light one. I believe, however, it will be found to be a pretty accurate record of most of the lepidoptera worth mentioning taken in Yorkshire during the past season, but if any entomologist has any additions to make they will be very welcome.

I have also gone through most of the magazines containing entomological literature, and I believe have made use of all notes of importance, which I have duly acknowledged when my information has been from these sources. My great difficulty has been to know which species to make a note of and which to omit. However, to be on the safe side, I have included observations on many common insects which ordinarily would have been better omitted.

My thanks are due to all those entomologists who kindly assisted me with their lists, and I am especially indebted to my friends Messrs. H. H. Corbett and G. T. Porritt for kindly revising and giving me their valuable assistance in the compilation of the following list.

I trust the list will be of some use, and I only hope it will give as much pleasure to the Yorkshire Lepidopterists to read an account of the year's work done by them during 1891, as it has given me pleasure to compile it.

The nomenclature is the same as Porritt's 'List of Yorkshire Lepidoptera.'

DIURNI.

Anthocharis cardamines. Fairly plentiful, but not to such an extent as last year.

Argynnis aglaia. One taken at Cloughton Moor, Y.N.U. meeting, Hayburn Wyke, July 11th.

Vanessa cardui. Common near Wath, Rotherham. 'A most unusual thing' (*Dr. B.*).

Arge galathea. One of the entomological features of the year. Retaken in Yorkshire, after a lapse of from twenty to twenty-five years, at the Y.N.U. meeting at Sledmere, August 3rd. *E.M.M.*, new series, vol. ii., p. 275; *Nat.*, vol. xvi., p. 300—303.

Satyrus ægeria. Common at Ackworth (*W.D.B.*); occurred also at Sledmere, Y.N.U. meeting, August 3rd.

Satyrus tithonus. One ♀ at Doncaster (*H.H.C.*).

Satyrus hyperanthus. Abounded at Sledmere, August 3rd.

Chortobius davus. Common at Thorne Moor, Doncaster (*H.H.C.* and *G.T.P.*).

Thecla w-album. Exceedingly scarce in its usually abundant localities around Doncaster and Rotherham (*J.B.*, *A.E.H.*, and *J.N.Y.*).

Lycæna argiolus. Much rarer than usual near Rotherham; Mr. Bloar, of that town, however, secured two striking varieties—one, a male, the same tint as the female, and the other an exceedingly pale male.

Thanaos tages. Very common at Strensall Common, York. Mr. Dutton writes: 'Some eighty or more fine specimens; previously to this I had only taken about a dozen in all my entomological career.'

Hesperia linea. Abundant at Thorne Moor, Doncaster, in July (*G.T.P.*).

NOCTURNI.

Procris statices. Grassington, Y.N.U. meeting, June 20th. Common at Doncaster, flying around thistle heads in afternoon sunshine, and also at Thorne (*H.H.C.*).

Smerinthus ocellatus. . A larva near Doncaster (*H.H.C.*).

Sphinx convolvuli. One at Barnsley, August 29th (*W.E.B.*); one at Harrogate, August 31st (*E.G.B.*); one at York, September 2nd, *Ent.*, vol. xxiv., p. 245; one at Ripon, September 20th, *Nat.*, vol. xvi., p. 338; and also reported from Tadcaster, *Nat.*, vol. xvii., p. 54.

Sesia bembeciformis. Cloughton Moor; Hayburn Wyke, Y.N.U. meeting, July 11th.

Zeuzera æsculi. One ♀ at Doncaster (*H.H.C.*); one ♂ at Barnsley (*W.E.B.*).

Nola cucullatella. Larvæ not uncommon near Thorne (*W.E.B.*).

Nudaria senex. One beaten from birch, Doncaster (*H.H.C.*).

Nudaria mundana. Larvæ at Grassington, Y.N.U. meeting, June 20th.

Lithosia complanula. Doncaster; common (*H.H.C.*).

Euchelia jacobeæ. Mr. H. H. Corbett bred from Doncaster larvæ some specimens which had the crimson replaced by buff or brick-red.

Arctia fuliginosa. Ackworth (*W.D.B.*); larvæ very common at York (*W.H.*).

Orgyia pudibunda. Doncaster; larvæ common (*H.H.C.*).

Demas coryli. Grass Wood, Grassington, Y.N.U. meeting, June 20th.

Pœcilocampa populi. Ackworth (*W.D.B.*).

GEOMETRÆ.

Epione vespertaria. Even commoner than usual at York; some nearly black specimens were taken (*W.H.* and *Entom.*, vol. xxiv., p. 270).

Epione advenaria. Larvæ taken, Y.N.U. Edlington Wood meeting, September 17th.

Venilia maculata. Grassington, Y.N.U. meeting, June 20th.

Eurymene dolabraria. One bred from larvæ taken near Sheffield (*A.E.H.*).

Selenia lunaria. Middlesbrough (*T.A.L.*).

Ennomos fuscantaria. Askern, one larva, July 25th (*G.T.P.*); one ♀ at York, September 30th (*Ent. Record*, vol. ii., p. 254).

Phigalia pilosaria. Several black specimens appear to have been taken, including one very dark one in my own garden at Sheffield.

Boarmia repandata. Many melanic forms taken. The larvæ here (Sheffield) are of two forms, a very light and a black one. I find the light form produced more melanic specimens than the black larvæ, and Mr. Batty, of this town, the same.

Hyria auroraria. Thorne Waste, July 18th (*H.H.C.* and *G.T.P.*).

Asthena luteata. Bishop's Wood (*W.M.*).

Asthena sylvata. Edlington Wood, Doncaster (*W.M.*).

Asthena blomeraria. Sledmere, Y.N.U. meeting, August 3rd; very common, but worn, and evidently been out some weeks.

Eupisteria heparata. Askern, July 25th (*G.T.P.*).

Venusia cambricaria. Grassington, common, Y.N.U. meeting, June 20th; Hayburn Wyke, Y.N.U. meeting, July 11th; Sledmere, commonly, but worn, Y.N.U. meeting, August 3rd.

Acidalia aversata. Golden-brown form, at Askern, July 25th (*G.T.P.*); Sledmere, Y.N.U. meeting, August 3rd.

Timandra amataria. Doncaster, abundant (*H.H.C.*).

Strenia clathrata. Common at Beast Cliffe and Hayburn Wyke, Y.N.U. meeting, July 11th.

Numeria pulveraria. Grass Wood, Grassington, Y.N.U. meeting, June 20th.

Aspilates strigillaria. Cloughton Moor, Hayburn Wyke, Y.N.U. meeting, July 11th.

Abraxas grossulariata. Commoner at Hull than known before (*J.W.B.*).

Abraxas ulmata. Larvæ unusually abundant, Y.N.U. meeting, Edlington Wood, September 17th; and they were also very common in the localities for this species around Sheffield.

Hybernia leucophæaria. Mr. H. H. Corbett, of Doncaster, writes: 'Abundant and varied, about one in six was the variety *marmoraria*. There were numerous intermediate forms between *marmoraria* and the type, and one specimen of the variety *nigricaria*.'

Oporabia filigrammaria. Dunford Bridge, abundant. One was a nice buff variety, totally different in colour to the ordinary form of this variable species (*G.T.P.*).

Larentia cæsiata. Ayton (*T.A.L.*). Huddersfield (*G.T.P.*).

Larentia ruficinctata. Hutton Bushel Moor, near Scarborough (*R.H.B.*), *Nat.*, vol. xvi., p. 277, 309, and 312.

Larentia olivata. Commoner than usual at Wilsden, where it is very local (*E.P.B.*).

Eupithecia venosata. Common near Sheffield (*A.E.H.*).

Eupithecia pulchellata. Doncaster, larvæ abundant (*H.H.C.*).

Eupithecia pygmæata. By river-side, Linton to the Grass Wood, Grassington, Y.N.U. meeting, June 20th.

Eupithecia trisignata. Larvæ, Edlington Wood, Y.N.U. meeting, September 17th.

Eupithecia lariciata. Imagines and larvæ common at Sheffield (*A.E.H.*); Grassington Y.N.U. meeting, June 20th; larvæ, Edlington Wood, Y.N.U. meeting, September 17th; abundant near York (*R.D.*).

Collix sparsata. Never known to occur so commonly at York. *Ent.*, vol. xxiv., p. 270.

Lobophora viretata. One at Grass Wood, Grassington, Y.N.U. meeting, June 20th.

Melanthia albicillata. Grass Wood, Grassington, Y.N.U. meeting, June 20th; Sledmere, Y.N.U. meeting, August 3rd; Doncaster, common (*H.H.C.*).

Melanippe hastata. Edlington and Wadworth Woods, Doncaster; Wharncliffe Wood, Sheffield (*A.E.H.*).

Melanippe tristata. Ayton (*T.A.L.*); Barnsley (*J.H.*); Wharncliffe Wood (*A.E.H.* and *G.T.P.*); Sheffield (*A.E.H.*).

Melanippe galiata. Mr. Porritt bred a large number of the dark form of this moth. Only this form is taken at Huddersfield, from which place the parents of these broods were taken.

Melanippe fluctuata. Several dark forms taken.

Phibalapteryx lignata. Fairly common at York. *Entom.*, vol. xxiv., p. 271.

Cidaria silaceata. Doncaster, common (*H.H.C.*); Barnsley, one, July 5th (*W.E.B.*).

Pelurga comitata. Abundant near Saltaire (*T.A.L.*).

Tanagra chærophyllata. Middlesbrough (*T.A.L.*).

DREPANULÆ.

Platypteryx falcula. Doncaster, common (*H.H.C.*); larvæ, Edlington and Wadworth Woods, Y.N.U. meeting, September 17th; larvæ, Thorne (*G.T.P.*).

PSEUDO-BOMBYCES.

Pygæra bucephala. Ackworth (*W.D.B.*), Kildale (*W.M.*), larvæ abundant at Doncaster (*H.H.C.*).

Notodonta dictæa. Ackworth (*W.D.B.*), bred from Thorne larvæ (*G.T.P.*).

Notodonta dictæoides. Bred from Thorne larvæ (*G.T.P.*).

Notodonta dromedarius. Bred from Thorne larvæ (*G.T.P.*); ova and larvæ taken at Hayburn Wyke, Y.N.U. meeting, July 11th.

Notodonta ziczac. Hayburn Wyke, Y.N.U. meeting, July 11th; Ackworth (*W.D.B.*).

Notodonta chaonia. One at Sheffield (*James B.*).

NOCTUÆ.

Thyatira derasa. One at sugar, Doncaster (*H.H.C.*).

Thyatira batis. Doncaster; common at sugar (*H.H.C.*).

Cymatophora fluctuosa. Always very local and rare around Sheffield, but much more so than usual (*A.E.H.*).

Cymatophora diluta. Doncaster; common at sugar.

Acronycta (Cuspidia) leporina. A large number in beautiful condition taken by the York entomologists; one at sugar, and one larva at Doncaster (*H.H.C.*); one larva at Scarborough (*Ent. Record*, vol. iii., p. 14).

Acronycta (Cuspidia) megacephala. Thorne (*G.T.P.*).

Acronycta (Viminia) rumicis. The variety *salicis* much commoner than type.

Leucania pudorina. Very abundant at York (*R.D.* and *W.H.*).

Hydræcia petasitis. Very rare in its Sheffield locality (*A.E.H.*).

Xylophasia rurea. The variety *combusta* appears to have been commoner than the type.

Xylophasia hepatica. York; a few at sugar (*W.H.*).

Xylophasia scolopacina. Rarer at Rotherham than usual (*J.B.*).

Xylophasia polyodon. Several melanic forms taken.

Charæas graminis. Doncaster (*H.H.C.* and *A.P.*).

Cerigo cytherea. York, a few (*W.H.*).

Luperina cespitis. One, Strensall Common, York (*W.H.*).

Apamea connexa. Much rarer than usual in its Sheffield localities.

Apamea gemina. Very common at York, where several striking varieties were taken.

Miana arcuosa. Abundant at Horsforth (*W.M.*); Middlesbrough (*T.A.L.*); Askern, females flying in sunshine (*G.T.P.*).

Grammesia trilinea. Doncaster; one at sugar (*H.H.C.*).

Rusina tenebrosa. Doncaster; abundant at sugar (*H.H.C.*).

Agrotis exclamationis. Exceedingly common at York. Mr. Dutton took a very fine variety, of which the following is his description: 'Ground colour being a kind of uniform cream colour, and the orbicular and reniform spots, instead of being darker than the ground colour, as in the type, are lighter and more faintly marked, which makes it appear a very striking variety.'

Agrotis ravida. Two taken at Hull by Mr. Hame (*J. W.B.*); one at Saltburn, August 25th, by Mr. Maddison (*Ent. Record*, vol. ii., p. 185).

Noctua augur. Mr. Dutton, of York, writes: 'I was also fortunate in obtaining two very pale forms of *N. augur* (if they are this species), but Mr. Tutt and others have seen one of the two, and I believe a doubt has been expressed as to whether they are not distinct from *N. augur*; one point in particular strikes me very much, and that is they are identical in size and expanse of wing, whereas the typical form and all I took on the same ground are much larger, which seems to me somewhat striking when seen amongst a series of the ordinary form, but to express any further opinion at present I must decline.'

Noctua dahlii. Much rarer than usual at Rotherham (*J.B.*), ditto at Sheffield (*James B.* and *A.E.H.*).

Noctua rubi. Very common at York; one, a very bright

yellow colour, was taken by Mr. Walker (*Ent. Record*, vol. ii., p. 184).

Pachnobia leucographa. Bishop's Wood (*W.M.*).

Tæniocampa populeti. Bishop's Wood (*W.M.*).

Orthosia suspecta. Extraordinarily abundant around York, and quite a feature of the year (*R.D.* and *W.H.*); flying commonly in day time at Dunford Bridge (*G.T.P.*); scarce around Rotherham (*J.B.*); and Sheffield (*A.E.H.*).

Orthosia macilenta. Rather common at Doncaster (*H.H.C.* and *A.P.*).

Anchocelis lunosa. One at sugar, Doncaster (*H.H.C.*).

Xanthia citrago. Larvæ very common at Rotherham (*J.N.Y.*).

Xanthia gilvago. Doncaster (*A.P.*).

Euperia fulvago. Wadworth Wood, Y.N.U. meeting, September 17th.

Cosmia diffinis and **Cosmia affinis.** Doncaster (*A.P.*).

Dianthæcia cucubali. York, common (*W.H.*).

Polia chi. Mr. Porritt writes: 'Early in October Mr. S. L. Mosley gave me an almost melanic ♀ *Polia chi*, which he had taken at Berry Brow, near Huddersfield. The specimen corresponded with a ♂ of the same form taken at Colne Bridge, Huddersfield, the previous year. The form is evidently a new one, and is much darker and of a different colour to the variety *olivacea*.'

Polia flavocincta. Doncaster; one at sugar (*H.H.C.*).

Dasypolia templi. Mr. E. P. Butterfield writes: 'Commoner than usual at Wilsden.'

Hadena suasa. A few taken at York, at sugar, in June (*W.H.*).

Cloantha solidaginis. Dunford Bridge, common (*G.T.P.*).

Calocampa exoleta. Doncaster (*H.H.C.*).

Cucullia verbasci. More abundant at Hull than ever known before (*J.W.B.*); larvæ were taken at Sledmere, Y.N.U. meeting, August 3rd.

Cucullia umbratica. Doncaster; a few taken flying over honeysuckle flowers (*H.H.C.*).

Anarta myrtilli. Thorne Moor, abundant, July 18th (*G.T.P.*); Cloughton Moor, Hayburn Wyke, Y.N.U. meeting, July 11th; scarce at Sheffield (*A.E.H.*).

Heliothis marginata. Larvæ at Scarborough (*W.F.* and *A.E.H.*).

Hydrelia unca. Unusually scarce at York, only two being seen (*R.D.* and *W.H.*).

Habrostola urticæ. Sheffield (*James B.*).

Habrostola triplasia. Sheffield (*James B.*); Horsforth (*W.M.*).

Plusia festucæ. Very common at York (*R.D.* and *W.H.*); one at Doncaster (*A.P.*).

Mania maura. Doncaster (*A.P.*).

Euclidia mi. Strensall Common, York, common (*W.H.*); Ackworth (*W.D.B.*).

Euclidia glyphica. Strensall Common, York, common (*W.H.*); Ackworth (*W.D.B.*).

PYRALIDES.

Pyrausta punicealis. Grassington, Y.N.U. meeting, June 20th.

Scoparia conspicualis = ulmella. Sledmere, Y.N.U. meeting, August 2nd.

CRAMBITES.

Crambus margaritellus. Thorne Moor (*G.T.P.*).

Crambus perlellus. Doncaster, a few flying at dusk (*H.H.C.*).

Phycis betulella. Doncaster; several bred, and one imago taken in centre of town.

Phycis carbonariella. Thorne Moor, abundant, July 18th (*G.T.P.*).

TORTRICES.

Tortrix sorbiana. Doncaster; larvæ on birch (*H.H.C.*).

Tortrix cinnamomeana. Askern, common, July 25th (*G.T.P.*); one larva on birch, Doncaster (*H.H.C.*); Sledmere, common, Y.N.U. meeting, August 3rd.

Tortrix icterana. Doncaster, abundant (*H.H.C.*); Grassington, Y.N.U. meeting, June 20th.

Amphysa walkerana. Doncaster, 'one on birch in April, the time of appearance is curious' (*H.H.C.*); only previously recorded from Huddersfield in the county.

Peronea comparana. Edlington Wood, Y.N.U. meeting, September 17th; Scarborough (*W.F.*).

Peronea schalleriana var. **latifasciana.** Scarborough (*W.F.*).

Peronea variegana var. **cirrana.** Scarborough (*W.F.*).

Argyrotoza conwayana. Askern, common, and some very pretty forms, July 25th (*G.T.P.*).

Penthina dimidiana. Birkby, Huddersfield, flying in profusion, July 8th (*G.T.P.*).

Clepsis rusticana. Doncaster, common (*H.H.C.*).

Pœdisca occultana. Larvæ common at Barnsley (*Ent. Record*, vol. ii., p. 232).

Semasia wœberana. Common in Doncaster (*H.H.C.*).

Argyrolepia cnicana. Doncaster, common (*H.H.C.*).

TINEÆ.

Lemnatophila phryganella. Doncaster, common (*H.H.C.*).

Epigraphia avellanella. Doncaster, common on birch (*H.H.C.*).

Micropteryx calthella. Doncaster, very abundant (*H.H.C.*).

Micropteryx purpurella, M. semipurpurella, and **M. unimaculella.** Doncaster, in thousands on birch (*H.H.C.*).

Adela degeerella. Doncaster, common (*H.H.C.*).

Plutella cruciferarum. The Diamond-back Moth occurs in thousands in Yorkshire as elsewhere.

Gelechia gemmella. Doncaster, abundant (*H.H.C.*).

Sophronia parenthesella. Doncaster, abundant (*H.H.C.*).

Œcophora flavimaculella. Only one seen at Doncaster after a diligent search, where hundreds might have been taken last year (*H.H.C.*).

Laverna raschkiella. Doncaster, very common, larvæ obtainable from the middle of June to end of October.

Chrysoclista flavicapitella. Doncaster, abundant (*H.H.C.*); Grassington, Y.N.U. meeting, June 20th.

Asychna terminella. Doncaster, abundant in larval state on *Circæa lutetiana.*

Elachista magnificella. A few mines taken at Sheffield (*A.E.H.*).

Lithocolletis vacciniella. Sheffield, common on the moors (*James B.* and *A.E.H.*).

Lithocolletis spinicolella. Doncaster, larvæ very abundant (*H.H.C.*).

Lithocolletis nicella. Edlington Wood, Y.N.U. meeting, September 17th.

Cemiostoma scitella. Edlington Wood, Y.N.U. meeting, September 17th.

Nepticula weaverella. Sheffield; as usual on the moors, but very local and the mines difficult to find (*James B.* and *A.E.H.*).

Nepticula tityrella. Edlington Wood, Y.N.U. meeting, September 17th.

PTEROPHORI.

Pterophorus (Platyptilia) gonodactylus = trigonodactylus. Common at Scarborough among the coltsfoot. (*W.F.*).

Pterophorus paludum. One specimen taken by Mr. G. T. Porritt on Thorne Waste, July 18th. A most interesting addition to the Yorkshire fauna. *Naturalist*, vol. xvi., p. 312; *E. M. M.*, new series, vol. ii., p. 275; *British Naturalist*, vol. i., p. 268.

Tachyporus tersus Er.

3. N.W.—Kingsdale (*J. W. Ellis, Nat.*, Feb. 1889, p. 60).

Tachyporus solutus Er.

3. N.W.—Aysgarth (*M. L. Thompson, Nat.*, Aug. 1893. p. 227).

Tachyporus brunneus F. It is singular that there is only one instance, so far as I know, of the capture of this species in Yorkshire, as it is considered a very common one.

2. N.E.—Saltburn (*M. L. Thompson*).

Tachyporus transversalis Grav.

2. N.E.—Scarborough (*R. Lawson*).

Lamprinus saginatus Grav.

2. N.E.—Scarborough (*R. Lawson*).

Cilea silphoides L. This insect is often very abundant in manure heaps, especially when there is heat in them.

2. N.E.—Scarborough district, abundant as early as February (*W.C.H.*).

3. N.W.—Knaresborough, in manure; Ilkley, among garden refuse (*W.C.H.*).

4. CENTRAL VALLEY.—York, under cut grass and in hedge cleanings (*W.C.H.*).

Tachinus rufipennis Gyll.

2. N.E.—Kettlewell, in dead grouse (*E. M. M.*, ix., 159).

Tachinus humeralis Grav.

2. N.E.—Saltburn (*M. L. Thompson*); Coxwold (*Nat.*, Nov. 1892, p. 351). Hutton Buscel Moor, swarming in rotten fungi among pine trees (*W.C.H.*).

Tachinus proximus Kr. An insect apparently referable to this species has been taken in a fungus by Mr. M. L. Thompson.

2. N.E.—Saltburn (*M. L. Thompson*).

Tachinus rufipes L. Very common and general.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Saltburn District (*M. L. Thompson*); Aislaby (*H. Pollard*, *Nat.*, Sept. 1879); Hayburn Wyke (*M. L. Thompson*, *Nat.*, Sept. 1891); Coxwold (*Nat.*, Nov. 1892).

3. N.W.—Leyburn, Settle (*W.C.H.*).

4. CENTRAL VALLEY.—York District (*W.C.H.*).

5. S.W.—Wakefield District (*E. B. Wrigglesworth*).

Tachinus subterraneus L. By no means common in Yorkshire.

2. N.E.—Saltburn (*M. L. Thompson*); Ayton, one example (*W.C.H.*).

4. CENTRAL VALLEY.—York, one specimen in my garden (*W.C.H.*).

Tachinus marginellus F. Very common and general, in moss and under stones.

1. S.E.—Hornsea Mere (*W. K. Bissill*, *Zool.*, 1859); Market Weighton (*Nat.*, Sept. 1888).

2. N.E.—Saltburn District (*M. L. Thompson*); Ayton (*W.C.H.*).

3. N.W.—Aysgarth (*M. L. Thompson*); Ilkley, Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Tachinus collaris Grav. Not uncommon under stones and in moss, and often occurs in profusion in flood refuse.

2. N.E.—Scalby (*W. Hey*); Derwent flood refuse and in moss at Ayton (*W.C.H.*).

3. N.W.—Kingsdale (*J. W. Ellis*, *Nat.*, Feb. 1889, p. 60).

4. CENTRAL VALLEY.—York, in haystacks, and profusely in the Ouse flood refuse (*W.C.H.*).

Tachinus elongatus Gyll. This conspicuous species does not appear to have been taken in Yorkshire for many years, but is recorded for the county as taken by Mr. Rudd, in *Stephens' Ill.*, April 30, 1835.

Megacronus cingulatus Mann. A very scarce species.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse*, *E. M. M.*, July, 1871).

Megacronus analis Grav. Less rare than the preceding, but far from common.

2. N.E.—Ayton, one or two examples (*W.C.H.*); Scarborough (*R. Lawson*).

4. CENTRAL VALLEY.—York District (*W.C.H.*).

Megacronus inclinans Grav.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse*, *MS.*, 1879).

Bolitobius lunulatus L. This insect is sure to be found more abundantly in the county than is shown.

2. N.E.—In Forge Valley, in a fungus (*W.C.H.*).

Bolitobius trinotatus Er. Another fungus-feeder, which is doubtless abundant.

2. N.E.—Hayburn Wyke, Crambe Beck (*W.C.H.*); Coxwold (*Nat.*, Nov. 1892, p. 351); Saltburn (*M. L. Thompson*).

Bolitobius exoletus Er.

2. N.E.—Coxwold (*Nat.*, Nov. 1892); Saltburn (*M. L. Thompson*).

Bolitobius pygmæus F.

2. N.E.—Coxwold (*Nat.*, Nov. 1892); Hayburn Wyke, Ayton, common (*W.C.H.*); Saltburn (*M. L. Thompson*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Mycetoporus lucidus Er. Very few records exist for this genus, which is probably generally distributed though scarce.

4. CENTRAL VALLEY.—In the Ouse flood-refuse at York (*W.C.H.*).

Mycetoporus lepidus Er.

2. N.E.—Boosbeck Moor (*M. L. Thompson*).

Mycetoporus longulus Mann.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvii., 6697).

2. N.E.—Scarborough (*Archdeacon Hey*); Saltburn (*M. L. Thompson*).

Mycetoporus clavicornis Steph.

2. N.E.—Saltburn *M. L. Thompson*).

NOTE.—Mr. Wilkinson of Scarborough, took a species of *Mycetoporus* in that neighbourhood, which was probably *M. monticola*, Fowler.

HABROCERINA.

Habrocerus capillaricornis Grav. This species seems to reach its northern limit in Yorkshire, where it has only been detected in one place.

2. N.E.—Scarborough (*R. Lawson*).

TRICHOPHYINA.

Trichophya pilicornis Gyll.

2. N.E.—Scarborough (*T. Wilkinson*).

STAPHYLININA.

Heterothops binotata Er. No recent record appears to exist for this species.

1. S.E.—Banks of the Humber (*Steph. Ill.* v., 257).

Heterothops prævia Er.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Studley, in decaying grass (*E. A. Waterhouse, E. M. M.*, Dec. 1871, viii., 161).

Quedius lateralis Grav. Though not many collectors have met with this conspicuous species in Yorkshire, Mr. Lawson described it to me as 'very common' about Scarborough. Personally, I have searched the district without success.

2. N.E.—Stockton (*Rudd*, 1835 ; *Steph. Ill.*, v., 435) ; Scarborough (*R. Lawson*).

3. N.W.—Studley (*E. A. Waterhouse, MS.*, 1879.

Quedius mesomelinus Marsh. This species appears to be common in the northern parts of the county, but I have never seen it in the York district.

2. N.E.—Saltburn (*M. L. Thompson*); Redcar (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse, E. M. M.*, Dec. 1871) ; Knaresborough (*W.C.H.*).

Var. **fageti** Thoms.

2. N.E.—Saltburn, in fungi (*M. L. Thompson*).

Quedius fulgidus F. A good deal of confusion has existed in this group of species. Probably Mr. Waterhouse took this along with *Q. mesomelinus* and *Q. puncticollis* at Studley (vide *E. M. M.*, Dec. 1871). The species is also recorded from Coxwold in the *Naturalist* for Nov. 1892.

Quedius puncticollis Thoms.

3. N.W.—Studley (*E. A. Waterhouse, MS.*, 1879).

Quedius cruentus Ol. Rather frequent though never plentiful.

1. S.E.—Withernsea (*Nat.*, Oct. 1892).

2. N.E.—Sneaton (*H. Crowther*) ; Cawton, in dung (*M. L. Thompson*).

3. N.W.—Ilkley, Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Quedius scitus Gyll.

3. N.W.—Studley, found in an old nest and the surrounding rotten wood (*E. A. Waterhouse, E. M. M.*, June 1871).

Quedius cinctus Payk. Very frequent, especially near the coast.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvii., 6697); Bridlington (*W.C.H.*).

2. N.E.—Ayton, Wykeham, Hayburn Wyke (*W.C.H.*); Scarborough (*R. Lawson*); Saltburn, Cawton (*M. L. Thompson*).

4. CENTRAL VALLEY.—York, not common (*W.C.H.*).

Quedius brevis Er.

2. N.E.—Scarborough (*R. Lawson*).

Quedius fuliginosus Grav. Very frequent.

1. S.E.—Hornsea (*W. K. Bissill*).

2. N.E.—Ayton (*W.C.H.*); Saltburn, Cawton (*M. L. Thompson*).

3. N.W.—Leyburn (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Quedius tristis Grav. Commoner than the preceding.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Redcar, Ayton (*W.C.H.*); Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*).

3. N.W.—Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—Boroughbridge (*Nat.*, July 1885).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Quedius molochinus Grav. Common in damp rubbish.

1. S.E.—Market Weighton (*W.C.H.*).

2. N.E.—Saltburn District, Cawton, Kildale (*M. L. Thompson*); Ayton (*W.C.H.*).

3. N.W.—Settle, Ilkley (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Quedius picipes Mann. Does not appear to occur, except near the coast.

2. N.E.—Hackness (*Archdeacon Hey*); Ayton (*W.C.H.*); Scarborough (*R. Lawson*); Saltburn (*M. L. Thompson*).

Quedius nigriceps Kr.

1. S.E.—Hornsea (*W. K. Bissill*, 1859).

Quedius maurorufus Grav. Probably common and general.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Scarborough District, common (*W.C.H.*).

4. CENTRAL VALLEY.—Askham Bog, and abundant in the Ouse flood-refuse at York (*W.C.H.*).

Quedius umbrinus Er.

3. N.W.—Studley (*E. A. Waterhouse*, July 1891).

Quedius rufipes Grav.

1. S.E.—Bridlington Quay (*W.C.H.*).

Quedius attenuatus Gyll. This species is rather abundant in the only district where it has been recorded.

2. N.E.—Scarborough (*R. Lawson*); Ayton, in moss, and abundantly in the flood-refuse of October, 1892 (*W.C.H.*).

Quedius semiæneus Steph.

1. S.E.—Bridlington Quay (*W.C.H.*).

Quedius boops Grav. An abundant species.

1. S.E.—Bridlington Quay (*W.C.H.*).

2. N.E.—Easby Moor (*M. L. Thompson*); Scarborough (*R. Lawson*); Ayton (*W.C.H.*).

3. N.W.—Ilkley (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Also reported from Yorkshire in *Stephens' Manual*, p. 393.

Creophilus maxillosus L. This conspicuous insect is commoner near the coast than inland, and generally occurs about decaying animal matter.

1. S.E.—Bridlington (*W. W. Fowler*); also taken very abundantly in a pig-sty at the same place (*W.C.H.*).

3. N.E.—Filey (*W. W. Fowler*); Cornelian Bay, flying on the shore, Redcar, in putrid fish, Ayton, in hedgehogs and rats (*W.C.H.*); Cleveland District (*M. L. Thompson*).

Leistotrophus nebulosus F. Not at all common.

2. N.E.—Saltburn, in garden refuse (*M. L. Thompson*); Ayton, in manure (*W.C.H.*).

Staphylinus pubescens DG. Very local.

2. N.E.—Scarborough (*R. Lawson*); Saltburn (*M. L. Thompson*).

4. Central Valley.—York, not uncommon; Haxby, in dung (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Staphylinus stercorarius Ol. Discovered in Yorkshire for the first time in the summer of 1895.

2. N.E.—Allerston, in an ant's nest; Ebberston (*W.C.H.*); Scarborough (*Gilbert Hudson*).

Staphylinus erythropterus L. Local, but more frequent than the preceding species.

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*).

3. N.W.—Near the High Force, Teesdale (*W.C.H.*).

4. Central Valley.—Ouse Banks at York (*W.C.H.*); Fulford Ings (*J. H. Smedley*, *Young Naturalist*, vol. 2, p. 44).

Staphylinus cæsareus Ceder.

2. N.E.—Moors near Scarborough, in very wet moss (*R. Lawson*).

3. N.W.—Hackfall (*E. G. Bayford*).

Ocypus olens Müll. The familiar Cocktail or Devil's Coachman is common everywhere. On one occasion I saw them running about in extraordinary numbers upon the asphalted paths on the North Cliff at Scarborough. Sometimes they occur in cellars, and Archdeacon Hey once found one in

the cellar of his house at York, sawing off the head of an unfortunate *Blaps*.

1. S.E.—Bridlington, Flamborough Head (*W.C.H.*); Withernsea (*Nat.*, Oct. 1892).

2. N.E.—Scarborough, Redcar (*W.C.H.*); Saltburn (*M. L. Thompson*).

3. N.W.—Swaledale (*W.C.H.*).

4. CENTRAL VALLEY.—York District (*W.C.H.*); Cowthorpe (*W. Denison Roebuck*).

5. S.W.—Wakefield District (*E. B. Wrigglesworth*).

Ocypus brunnipes F. This local insect is unusually common in some parts of Yorkshire.

2. N.E.—Ayton, Redcar (*W.C.H.*); Saltburn (*M. L. Thompson*).

3. N.W.—Richmond, Ilkley (*W.C.H.*); Aysgarth (*Nat.*, Oct. 1892).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Ocypus fuscatus Grav. This scarce species seems not to have been met with by any Yorkshire collector but myself, and I have not taken it in its natural habitat.

4. CENTRAL VALLEY.—York, in the flood rejectamenta of the Ouse, four specimens in ten years (*W.C.H.*).

Ocypus cupreus Rossi. Very abundant in some districts, in others rather scarce.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Ayton (*W.C.H.*); Scarborough (*R. Lawson*) Saltburn (*M. L. Thompson*).

3. N.W.—Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York. Sometimes in thousands in the Ouse flood-refuse (*W.C.H.*).

Ocypus pedator Grav. This scarce southern species has been most unexpectedly discovered at York by Mr. Gilbert Hudson of that city. It was taken under stones in company with *Ocypus olens*.

4. CENTRAL VALLEY.—York, several specimens (*G. Hudson*, identified by *W.C.H.*).

Ocypus ater Grav. A maritime insect.

2. N.E.—Eston Marsh (*M. L. Thompson*).

Ocypus morio Grav. Frequent, especially in hilly districts.

2. N.E.—Ayton, Scarborough (*W.C.H.*); Saltburn (*M. L. Thompson*).

3. N.W.—Richmond (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Philonthus splendens F. Very frequent, generally in dung.

1. S.E.—Flamborough (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*); Ayton, Ebberston, Langdale (*W.C.H.*); Filey (*W. W. Fowler*); Coxwold (*Nat.*, Nov. 1892); Stanghow Moor (*M. L. Thompson*).

3. N.W.—Leyburn, Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York District (*W.C.H.*).

Philonthus intermedius Boisd.

2. N.E.—Glaisdale (*H. Crowther*, *Nat.*, Jan. 1879, iv. 84).

4. CENTRAL VALLEY.—Haxby (*W.C.H.*).

Philonthus laminatus Creutz. Frequent.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Ayton (*W.C.H.*); Aislaby (*H. Pollard*, *Nat.*, Sep. 1879); Saltburn (*M. L. Thompson*).

3. CENTRAL VALLEY.—Ouse rejectamenta, often in immense numbers (*W.C.H.*).

Philonthus æneus Rossi. The commonest of the large species in this county.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Redcar, Ayton (*W.C.H.*); Saltburn (*M. L. Thompson*); Coxwold (*Nat.*, Nov. 1892).

3. N.W.—Leyburn, Ilkley, Knaresborough (*W.C.H.*).

4. CENTRAL.—York (*W.C.H.*).

5. S.W.—Wakefield, Hebden Bridge (*E. B. Wrigglesworth*); Askern (*Nat.*, Sept. 1892).

Philonthus proximus Kr. Very scarce, or not generally distinguished from the preceding species, though taken freely at Saltburn.

2. N.E.—Saltburn, Cawton (*M. L. Thompson*).

Philonthus addendus Sharp. Another species which may perhaps be passed over for a common one.

3. N.W.—Ilkley, a single specimen from refuse thrown into a dry water-course (*W.C.H.*).

Philonthus decorus Gr. Locally abundant. Sometimes occurs in flood-refuse in immense numbers.

2. N.E.—Ayton, Lastingham (*W.C.H.*); Scarborough (*R. Lawson*); Pickering, Saltburn (*M.L.Thompson*); Hutton Buscel Carrs (*J. Raine*).

3. N.W.—Ingleton (*J. W. Ellis*); Richmond, Settle, Knaresborough (*W.C.H.*); Studley (*E. A. Waterhouse*); Aysgarth (*Nat.*, Aug. 1893).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Philonthus politus F. Very frequent.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Ayton, Marske (*W.C.H.*); Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*).

4. CENTRAL VALLEY.—Selby, York District generally (*W.C.H.*).

5. S.W.—Rivelin Valley (*E. B. Wrigglesworth*).

Philonthus lucens Er. A very scarce insect, of which I shook a single specimen out of a dry tussock on Strensall Common. Identified by Canon Fowler.

4. CENTRAL VALLEY.—Strensall Common, May 12, 1885, (*W.C.H.*).

Philonthus varius Gyll. A most abundant species.

1. S.E.—Bridlington District (*W.C.H.*).

2. N.E.—Aislaby (*H. Pollard, Nat.*, Sept. 1879); Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*).

3. N.W.—Aysgarth (*Nat.*, Aug. 1892).

4. CENTRAL VALLEY.—York District, very common (*W.C.H.*).

Philonthus marginatus F. Generally distributed, and not uncommon, generally in dung.

1. S.E.—Market Weighton (*W.C.H.*).

2. N.E.—Redcar, Ayton (*W.C.H.*); Scarborough (*R. Lawson*); Saltburn (*M. L. Thompson*); Coxwold (*Nat.*, Nov. 1892).

3. N.W.—Clapham (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Philonthus umbratilis Grav. Scarce and local.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvii, 6697).

2. N.W.—Ilkley (*W.C.H.*).

Philonthus fimetarius Grav. Very common.

2. N.E.—Ayton (*W.C.H.*); Saltburn (*M. L. Thompson*).

3. N.W.—Harrogate (*W. D. Roebuck*); Copgrove (*Steph. Ill.*, July 31, 1832).

4. CENTRAL VALLEY.—York (*W.C.H.*)

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Philonthus cephalotes Grav.

2. N.E.—Saltburn, in decaying fish (*M. L. Thompson*).

Philonthus sordidus Grav. No doubt fairly plentiful, though seldom recorded.

2. N.E.—Scarborough (*R. Lawson*); Saltburn (*M. L. Thompson*); Ayton, common (*W.C.H.*).

3. N.W.—Knaresborough (*W.C.H.*).

N.B.—Some *Philonthi* collected by me under sea-weed at Redcar resemble this species in punctuation, but their general aspect is more like *P. cephalotes*.

Philonthus ebeninus Grav.

2. N.E.—Saltburn (*M. L. Thompson*).

Philonthus corvinus Er. This scarce species has only been recorded from the coast.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvii, 6697).

2. N.E.—Redcar, under dry fucus (*W.C.H.*); Redcar sand-hills (*M. L. Thompson*).

Philonthus sanguinolentus Grav.

2. N.E.—Scarborough (*W.C.H.*)

Philonthus cruentatus Gmel.

2. N.E.—Redcar (*W.C.H.*).

Philonthus longicornis Steph.

3. N.W. — Copgrove (*Kirby, MS., Steph. Ill.*, July 31, 1832).

Philonthus varians Payk. Very common in dung.

1. S.E.—Market Weighton (*W.C.H.*).

2. N.E.—Hackness (*W. Hey*); Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*); Redcar, Ayton (*W.C.H.*).

4. Central Valley.—York (*W.C.H.*).

Philonthus discoideus Grav.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*).

Philonthus ventralis Gr.

2. N.E.—Ayton, in dung heaps (*W.C.H.*).

Philonthus fumarius Gr.

4. CENTRAL VALLEY.—York, in flood-refuse (*W.C.H.*).

Philonthus micans Grav.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvii., 6697).

Philonthus nigritulus Grav.

2. N.E.—Scarborough (*R. Lawson*).

Philonthus trossulus Nord. This little species will no doubt prove to be commonly distributed.

2. N.E.—Redcar, Ayton (*W.C.H.*); Saltburn (*M. L. Thompson*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Philonthus fulvipes F.

3. N.W.—Studley, in wet shingle by the Skell (*E. A. Waterhouse, E. M. M.*, July 1871).

Philonthus puella Nord. Frequent, but generally met with singly.

2. N.E.—Saltburn (*M. L. Thompson*); Hayburn Wyke, Yedmandale (*W.C.H.*); Coxwold (*Nat.*, Nov. 1892).

3. N.W.—Ilkley (*W.C.H.*); Studley (*E. A. Waterhouse*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Cafius fucicola Curtis. Recorded from Redcar 'in profusion' by the Rev. G. T. Rudd (*Steph. Ill.*, v. 246, Nov. 30, 1833), but recent collectors have failed to find it there.

Cafius xantholoma Grav. Swarms in sea-weed all along the coast.

1. S.E.—Bridlington (*W. W. Fowler*); Flamborough Head (*W.C.H.*).

2. N.E.—Cayton Bay, Hayburn Wyke, Redcar (*W.C.H.*); Filey (*W. W. Fowler*); Saltburn (*M. L. Thompson*).

Cafius sericeus Holme.

2. N.E.—Cornelian Bay, in sea-weed (*R. Lawson*).

Actobius cinerascens Grav.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859, xvi, 6697.

XANTHOLININA.

Xantholinus fulgidus F.

1. S.E.—Withernsea (*Y.N.U., Nat., Oct.* 1892).

Xantholinus glabratus Grav. Rather local, but sometimes very plentiful.

1. S.E.—Bridlington, Flamborough (*W.C.H.*); Withernsea (*Y.N.U., Nat.*, Oct. 1892).

2. N.E.—Filey, washed up on one occasion in vast numbers on the sands (*W.C.H.*); Scarborough (*R. Lawson*); Saltburn, Cawton (*M. L. Thompson*).

4. CENTRAL VALLEY.—York, Selby (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Xantholinus punctulatus Payk. Common and general.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).

2. N.E.—Hayburn Wyke, Redcar (*W.C.H.*); Saltburn (*M. L. Thompson*); Aislaby (*H. Pollard, Nat.*, Sept. 1879).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Xantholinus tricolor F. Rare in Yorkshire, as in all the Northern Counties.

2. N.E.—Saltburn, Pickering (*M. L. Thompson*).

Xantholinus linearis Ol. Rather common.

2. N.E.—Saltburn, Cawton (*M. L. Thompson*).

4. CENTRAL VALLEY.—York District (*W.C.H.*).

5. S.W.—Holmfirth (*S. L. Mosley, Nat.*, July 1889).

Xantholinus longiventris Heer.

4. CENTRAL VALLEY.—York (*W.C.H.*).

Xantholinus ochraceus Gyll.

2. N.E.—Saltburn, on the coast (*M. L. Thompson*).

Leptacinus linearis Grav.

2. N.E.—Saltburn (*M. L. Thompson*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Leptacinus formicetorum Mærk.

2. N.E.—Scarborough, in nests of *Formica rufa* (*T. Wilkinson, E. M. M.*, June 1865).

Baptolinus alternans Grav. Not uncommon where rotten timber occurs, but local.

2. N.E.—Hackness Woods in mid-winter (*W.C.H.*); Saltburn Woods (*M. L. Thompson* and *W.C.H.*).

5. S.W.—Wakefield, about old timber (*E. B. Wrigglesworth*).

Othius fulvipennis F. Very common and general under stones and in damp refuse.

2. N.E.—Saltburn (*M. L. Thompson*); West Ayton (*W.C.H.*).

3. N.W.—Richmond (*W.C.H.*); Aysgarth (*M. L. Thompson*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Rivelin Valley (*E. B. Wrigglesworth, Nat.*, June, 1881).

Othius læviusculus Steph. Local and scarce.

1. S.E.—Bridlington Quay (*W.C.H.*).

5. S.W.— Rivelin Valley (*E. B. Wrigglesworth, Nat.*, June 1881).

Othius melanocephalus Grav. Probably common and general.

2. N.E.—Scarborough (*R. Lawson*); Saltburn and Easby Moor (*M. L. Thompson*); West Ayton (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Othius myrmecophilus Kies.

2. N.E.—Roots of grass on the sea-banks, Saltburn ; Hutton Moor, in ants' nests (*M. L. Thompson*).

PÆDERINA.

Lathrobium elongatum L. Not uncommon.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).
2. N.E.—West Ayton (*W.C.H.*).
5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Lathrobium boreale Hoch. May be expected to prove not rare.

2. N.E.—Langdale End (*W.C.H.*) ; Saltburn (*M. L. Thompson*).

Lathrobium fulvipenne Grav.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).
2. N.E.—Saltburn, Cawton (*M. L. Thompson*) ; Aislaby (*H. Pollard, Nat.*, Sept. 1879).
4. CENTRAL VALLEY.—York (*W.C.H.*).

Lathrobium brunnipes F. Common and general.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).
2. N.E.—Marton (*G. T. Rudd, Steph. Ill.*) ; Saltburn (*M. L. Thompson*) ; West Ayton (*W.C.H.*).
3. N.W.—Ingleton, Richmond (*W.C.H.*).
4. CENTRAL VALLEY.—Selby (*W.C.H.*).
5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Lathrobium quadratum Payk.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).
2. N.E.—Scarborough (*R. Lawson*).

Lathrobium terminatum Grav.

2. N.E.—Scarborough (*R. Lawson*).
4. CENTRAL VALLEY.—Askham Bog (*W.C.H.*).

Lathrobium multipunctum Grav.

1. S.E.—Bridlington (*Canon W. W. Fowler*).

2. N.E.—Scarborough (*R. Lawson*).

Stilicus rufipes Germ.

3. N.W.—Richmond (*W.C.H.*).

4. CENTRAL VALLEY.—York, Boroughbridge (*W.C.H.*)

Stilicus affinis Er. The commonest species in Yorkshire, sometimes swarming in haystack bottoms.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Saltburn (*M. L. Thompson*); West Ayton (*W.C.H.*).

4. CENTRAL VALLEY.—York district (*W.C.H.*).

Stilicus orbiculatus Er. Local and not plentiful.

2. N.E.—West Ayton, in mid-winter (*W.C.H.*); Scarborough (*R. Lawson*).

4. CENTRAL VALLEY.—Askham Bog, in a fungus (*W.C.H.*).

Medon brunneus Er.

2. N.E.—Byland Abbey (*M. L. Thompson*).

Medon fusculus Mann. A species which is rare North of London, and not, I think, hitherto recorded for Yorkshire.

2. N.E.—Forge Valley, several specimens under stones (*W.C.H.*).

Medon melanocephalus F.

4. CENTRAL VALLEY.—York, haystack refuse in winter (*W.C.H.*).

Medon obsoletus Nord.

2. N.E.—Scarborough (*R. Lawson*).

Lithocharis ochracea Grav. This species is sure to be more widely found.

2. N.E.—Saltburn (*M. L. Thompson*).

Pæderus littoralis Grav. Local, and not plentiful.

1. S.E.—Brough (*E. B. Wrigglesworth*).

2. N.E.—Raincliffe Bog near Scarborough (*R. Lawson*).

4. CENTRAL VALLEY. — Askham Bog, one example (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Pæderus riparius L.

4. CENTRAL VALLEY.—Askham Bog (*R. Cook and Archdeacon Hey*).

EVÆSTHETINA.

Evæsthetus scaber Grav.

2. N.E.—Marton (*Rev. G. T. Rudd*).

Evæsthetus ruficapillus Lac.

2. N.E.—Scarborough, by beating oaks (*R. Lawson*).

4. CENTRAL VALLEY.—York, in haystack refuse (*Archdeacon Hey*).

STENINA.

Dianous cœrulescens Gyll. Rather local, but often plentiful by running water.

2. N.E.—Scalby Beck (*R. Lawson*); West Ayton Mill Dam (*W.C.H.*); Brompton (*W.C.H.*); Levisham Beck (*W.C.H.*).

3. N.W.—Studley (*E. A. Waterhouse*).

4. CENTRAL VALLEY.—River Foss, at the backwater of locks (*W.C.H.*).

5. S.W.—Halifax (*A. H. Davies, Steph. Ill.*).

Stenus biguttatus L. Of this large and well-defined genus, thirty-five species have been recorded for Yorkshire. The comparative ease with which the species are identified probably explains the number of records. The present species appears to be confined to the vale of York, where it is local and scarce.

4. CENTRAL VALLEY.—Selby, Strensall (*W.C.H.*).

Stenus bipunctatus Er. A southern species only recently detected in Yorkshire.

4. CENTRAL VALLEY. — Askham Bog, one example (*W.C.H.*).

Stenus guttula Müll. Perhaps the most general of the spotted species, as it is usually to be found where suitable localities occur.

1. S.E.—Bridlington Cliffs (*W.C.H.*).

2. N.E.—West Ayton, Langdale End, Redcar (*W.C.H.*); Saltburn (*M. L. Thompson*) ; Marton (*Rev. G. T. Rudd*).

3. N.W.—Leyburn.

4. CENTRAL VALLEY.—Askham, Cattal, Boston Spa (*W.C.H.*).

Stenus bimaculatus Gyll. Locally abundant.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).

2. N.E.—Marton (*Rev. G. T. Rudd*) ; Forge Valley (*W.C.H.*).

4. CENTRAL VALLEY.—York, sometimes abounds in moss in winter (*W.C.H.*).

5. S.W.—Hebden Bridge (*E. B. Wrigglesworth*).

Stenus juno F. Abundant in marshy places.

1. S.E.—Hornsea Mere (*W. K. Bissill, Zool.*, 1859); Bridlington Quay (*W.C.H.*).

2. N.E.—West Ayton, very common (*W.C.H.*); Scarborough (*R. Lawson*).

4. CENTRAL VALLEY.—York (*W.C.H.*); Askham Bog (*Archdeacon Hey*).

Stenus guynemeri Duv. Local and scarce.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Leyburn (*W.C.H.*).

Stenus speculator Er. Probably the commonest species of *Stenus* in Yorkshire, abounding in haystack refuse, etc.

2. N.E.— Scarborough District (*W.C.H.*); Saltburn (*M. L. Thompson*).

4. CENTRAL VALLEY.—York District (*W.C.H.*).

Stenus providus v. **rogeri** Kr. Much less plentiful than the foregoing species.

2. N.E.—Hutton Moor (*M. L. Thompson*); West Ayton (*W.C.H.*).

3. N.W.—Leyburn (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Stenus bupthalmus Grav. A common species.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).

2. N.E.—Saltburn (*M. L. Thompson*); West Ayton (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Stenus melanopus Marsh.

1. S.E.—Bridlington Cliffs (*Canon W. W. Fowler*).

Stenus canaliculatus Gyll.

2. N.E.—Aislaby (*H. Pollard*, *Nat.*. Sept. 1879).

5. S.W.—Washburndale (*R. Rosenstock*, *Nat.*, Nov. 1885).

Stenus pusillus Er. A very inconspicuous species which is probably not uncommon.

2. N.E.—West Ayton, plentiful (*W.C.H.*).

Stenus vafellus Er.

1. S.E.—Hornsea (*W. K. Bissill*, *Zool.*, 1859).

Stenus declaratus Er. This is sure to be found more generally.

4. CENTRAL VALLEY.—Strensall (*W.C.H.*).

Stenus crassus Steph.

2. N.E.—Saltburn (*M. L. Thompson*).

3. N.W.—Knaresborough (*W.C.H.*).

Stenus argus Grav. One example apparently referable to this species has been taken at the roots of grass on sea-banks.

2. N.E.—Saltburn (*M. L. Thompson*).

Stenus nigritulus Gyll.

2. N.E.—Scarborough (*Fowler's Coleoptera*, vol. ii., p. 345).

Stenus brunnipes Gyll. A very common insect.

1. S.E.—Flamborough and South Ferriby (*T. V. Wollaston*).

2. N.E.—West Ayton (*W.C.H.*); Saltburn (*M. L. Thompson*).

3. N.W.—Ingleton (*J. W. Ellis*).

Stenus subæneus Er.

2. N.E.—Saltburn, in a sand-pit on the sea-banks (*M. L. Thompson*).

Stenus impressus Germ. One of our commoner species.

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough (*Archdeacon Hey*); Hayburn Wyke (*W.C.H.*).

3. N.W.—Ingleton (*J. W. Ellis*).

Stenus ærosus Er. Only once taken.

2. N.E.—Arncliffe Wood near Whitby, on herbage (*M. L. Thompson*).

Stenus erichsoni Rye. Another species only once taken to my knowledge.

2. N.E.—Hackness, in wet moss in a subalpine wood in December 1894 (*W.C.H.*).

Stenus flavipes Steph.

1. S.E.—Bridlington and Ferriby (*T. V. Wollaston*).

Also recorded from Yorkshire in *Steph. Ill.*, Dec. 31, 1833, and *Steph. Manual*, p. 412.

Stenus pubescens Steph. This conspicuous species is often taken abundantly in the water net.

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough, common throughout the district as at East and West Ayton, Brompton, Seamer, etc. (*W.C.H.*).

4. CENTRAL VALLEY.—York district, not so plentiful (*W.C.H.*).

5. S.W.—Walton (*E. B. Wrigglesworth*).

Stenus binotatus Ljungh. In company with the foregoing, but much more local and less plentiful.

2. N.E.—West Ayton (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Stenus pallitarsis Steph.

1. S.E.—Hornsea Mere (*W. K. Bissill, Zool.*, 1859).

Stenus bifoveolatus Gyll. Probably not uncommon in suitable localities throughout the county.

2. N.E.—Scarborough district in many places (*W.C.H.*).

4. CENTRAL VALLEY.—Askham Bog and other places about York (*W.C.H.*).

Stenus nitidiusculus Steph. Rather commoner than the preceding species.

2. N.E.—Saltburn (*M. L. Thompson*); West Ayton, Seamer (*W.C.H.*).

3. N.W.—Leyburn (*W.C.H.*); Ingleton (*J. W. Ellis*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Stenus picipennis Er. Not hitherto recorded from Yorkshire. I took a single example in 1894.

2. N.E.—East Ayton, in a marsh (*W.C.H.*).

Stenus picipes Steph. One of the commonest of beetles.

1. S.E.—Danes Dike, South Ferriby (*T. V. Wollaston*).

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough District (*W.C.H.*).

4. CENTRAL VALLEY.—York district (*W.C.H.*).

Stenus cicindeloides Grav. Scarce, except about York.

2. N.E.—Scarborough (*Archdeacon Hey*).

4. CENTRAL VALLEY.—York District in many places (*W.C.H.*).

Stenus similis Herbst. A conspicuous and common species.

1. S.E.—Bridlington Quay (*T. V. Wollaston*).

2. N.E. — Hutton Buscel, by sweeping (*W.C.H.*); Cawton (*M. L. Thompson*).

3. N.W.—Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York district (*W.C.H.*).

Stenus tarsalis Ljungh. Another common species.

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough (*W.C.H.*).

4. CENTRAL VALLEY. — York district, everywhere (*W.C.H.*).

Stenus paganus Er. Very local.

2. N.E. — West Ayton, confined to one haystack (*W.C.H.*).

4. CENTRAL VALLEY.—Askham Bog (*W.C.H.*).

Stenus latifrons Er. Local and not common.

1. S.E.—Hornsea (*W. K. Bissill, Zool.*, 1859).

2. N.E.—Hayburn Wyke (*W.C.H.*).

4. CENTRAL VALLEY.—Strensall (*W.C.H.*).

OXYPORINA.

Oxyporus rufus L. Local and not common.

1. S.E.—Market Weighton (*E. G. Bayford, Nat.*, Nov. 1888).

2. N.E.—Scarborough, in flood refuse and in fungi (*R. Lawson*).

4. CENTRAL VALLEY.—Askham Bog (*R. Cooke*); Goole (*W. Denison Roebuck*).

OXYTELINA.

Bledius tricornis Herbst. This species seems to have become much scarcer than formerly.

1. S.E.—Sunk Island (*Archdeacon Hey*).

2. N.E.—Redcar (*Rev. G. T. Rudd*, vide *Ent.*, August 1878).

Bledius arenarius Payk.

2. N.E.—Saltburn, common (*M. L. Thompson*); Scarborough (*R. Lawson*); shores of the Tees in profusion (*G. T. Rudd, Steph. Ill.*, Jan. 31, 1834).

Bledius pallipes Grav.

2. N.E.—Scarborough (*Fowler's Coleoptera*, ii., 368).

Bledius subterraneus Er.

2. N.E.—Scarborough, in flood refuse (*R. Lawson*).
3. N.W.—Studley (*E. A. Waterhouse*).

Bledius longulus Er.

2. N.E.—Saltburn (*M. L. Thompson*); Scalby (*R. Lawson*).

Bledius fracticornis Payk.

2. N.E.—Cornelian Bay (*R. Lawson*). Yorkshire is given as a locality in *Stephens' Manual.*

Bledius opacus Block.

1. S.E.—Bridlington Quay (*Canon Fowler*).
2. N.E.—Cornelian Bay (*R. Lawson*).

Bledius dissimilis Er.

1. S.E.—Bridlington Quay (*Canon Fowler*).

N.B.—This insect was originally mistaken for *Bledius erraticus*, which has not been taken in Yorkshire.

Platystethus arenarius Fourc.

2. N.E.—Saltburn (*M. L. Thompson*); Eston (*Archdeacon Hey*); Redcar (*W.C.H.*).
3. N.W.—Leyburn (*W.C.H.*).
4. CENTRAL VALLEY.—Strensall (*W.C.H.*).

Platystethus cornutus Gyll.

2. N.E.—Scarborough (*R. Lawson*); Redcar (*W.C.H.*).

This and the preceding species are both recorded for Yorkshire in *Steph. Ill.*, v. 314 (*G. T. Rudd*).

Oxytelus rugosus Grav. Very common in dung and decayed matter.

1. S.E.—Hornsea Mere (*W. K. Bissill*).

2. N.E.—Saltburn (*M. L. Thompson*); Scarborough (*R. Lawson*); West Ayton (*W.C.H.*).

3. N.W.—Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—York district (*W.C.H.*).

Oxytelus sculptus Grav. Probably not uncommon.

2. N.E.—Saltburn (*M. L. Thompson*); West Ayton (*W.C.H.*).

Oxytelus laqueatus Marsh. Common.

2. N.E.—Saltburn, Cawton (*M. L. Thompson*); Scarborough (*R. Lawson*).

3. N.W.—Leyburn, Knaresborough (*W.C.H.*).

4. CENTRAL VALLEY.—Haxby (*W.C.H.*).

Oxytelus sculpturatus Grav.

2. N.E.—Saltburn, common (*M. L. Thompson*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Oxytelus nitidulus Grav.

2. N.E.—Saltburn (*M. L. Thompson*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Oxytelus tetracarinatus Block.

2. N.E.—Saltburn, Cawton (*M. L. Thompson*); Redcar (*W.C.H.*); Scarborough (*R. Lawson*).

3. N.W.—Aysgarth (*M. L. Thompson*).

Ancyrophorus homalinus Er.

2. N.E.—Scalby Beck, flood refuse (*T. Wilkinson* and *R. Lawson*).

Ancyrophorus aureus Fauv.

2. N.E.—Scalby Beck, flood refuse (*T. Wilkinson* and *R. Lawson*).

Trogophlœus arcuatus Steph.

2. N.E.—Scarborough (*Archdeacon Hey*).
3. N.W.—Ingleton (*J. W. Ellis*).

Trogophlœus bilineatus Steph.

2. N.E.—Scarborough (*T. Wilkinson*).

Trogophlœus elongatulus Er.

2. N.E.—Scarborough (*T. Wilkinson*).

Trogophlœus corticinus Grav.

2. N.E.—Scarborough (*T. Wilkinson*).

Thinobius linearis Kr.

2. N.E.—Scarborough (*T. Wilkinson*, *Ent. Annual*, 1867, p. 67); Hayburn Wyke (*R. Lawson*).

Thinobius longipennis Heer.

2. N.E.—Scalby Beck, in gravel (*R. Lawson*).

3. N.W.—Studley, in wet shingle by the Skell (*E. A. Waterhouse*, *E. M. M.*, July 1871).

Syntomium æneum Müll.

2. N.E.—Scarborough, by beating in Raincliff Wood (*R. Lawson*).

Coprophilus striatulus F. Local and scarce.

2. N.E.—Scarborough (*R. Lawson*); West Ayton (*W.C.H.*).

Deleaster dichrous Grav. var. **leachii** Curt.

2. N.E.—Scalby Beck, flood refuse (*R. Lawson*); vide *E. M. M.*, June 1871.

HOMALIINA.

Anthophagus testaceus Grav.

2. N.E.—Scarborough, by beating oaks (*R. Lawson*) ; Saltburn Woods (*M. L. Thompson*); Crambe Beck (*W.C.H.*).

Anthophagus alpinus Payk.

3. N.W.—Studley (*E. A. Waterhouse from MS. of Archdeacon Hey*).

Geodromicus nigrita Müll.

2. N.E.—Scarborough (*R. Lawson*).

3. N.W. — Ingleton, from shingle by the R. Doe (*J. W. Ellis*).

Lesteva longelytrata Goeze. Locally abundant.

1. S.E.—Bridlington (*W.C.H.*).

2. N.E.—Saltburn (*M. L. Thompson*) ; Scarborough (*W.C.H.*).

3. N.W.—Leyburn (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Lesteva sicula Er.

2. N.E.—West Ayton (*W.C.H.*).

Lesteva punctata Er.

4. CENTRAL VALLEY.—York, in cut grass (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Acidota crenata F. Excessively rare.

2. N.E.—Ringing Keld, seven miles north of Scarborough, in *Sphagnum* (*R. Lawson*).

4. CENTRAL VALLEY.—Leckby Carr, among fir chips, one specimen (*M. L. Thompson*).

Acidota cruentata Mann.

2. N.E.—Scarborough (*R. Lawson*).

Olophrum piceum Gyll. Not uncommon.

2. N.E.— Scarborough, West Ayton, Langdale End (*W.C.H.*) ; Stanghow Moor (*M. L. Thompson*).

4. CENTRAL VALLEY.—Askham Bog (*W.C.H.*).

Olophrum fuscum Grav.

2. N.E.—Scarborough (*R. Lawson*).

Olophrum consimile Gyll.

2. N.E.—Scarborough (*R. Lawson*).

NOTE.—Although Scarborough seems an improbable locality for such an Alpine species, Mr. Lawson (who was a most cautious man) was positive he had taken it in that neighbourhood.

Lathrimæum atrocephalum Gyll. Not common.

2. N.E.—Scarborough (*R. Lawson*) ; West Ayton (*W.C.H.*).

Lathrimæum unicolor Steph. Much more plentiful than the preceding.

2. N.E.—West Ayton, very abundant in haystack bottoms and in flood refuse (*W.C.H.*).

3. N.W.—Ingleton (*J. W. Ellis*).

Deliphrum tectum Payk.

1. S.E.—Beverley, taken in cow-dung by Mr. Spence (*Kirby MS., Steph. Ill.*, v., 341).

2. N.E.—Scarborough, in flood refuse (*R. Lawson*).

Philorhinum sordidum Steph.

2. N.E.—Forge Valley, in flowers of whin (*W.C.H.*) ; Scarborough (*R. Lawson*).

Coryphium angusticolle Steph.

3. N.W.—Studley (*E. A. Waterhouse, E. M. M.*, March 1868).

Homalium rivulare Payk. Very common.

2. N.E.—Scarborough, Hackness, Levisham (*W.C.H.*) ; Saltburn (*M. L. Thompson*).

4. CENTRAL VALLEY.—York District (*Archdeacon Hey*).

Homalium læviusculum Gyll.

1. S.E.—Bridlington Quay (*W.C.H.*).

2. N.E. — Saltburn, in decaying sea-weed (*M. L. Thompson*) ; Scarborough (*R. Lawson*).

Homalium riparium Thoms.

2. N.E.—Saltburn, in decaying fish (*M. L. Thompson*).

Homalium excavatum Steph. An abundant species in haystack bottoms.

2. N.E. — West Ayton (*W.C.H.*) ; Scarborough (*R. Lawson*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Homalium nigriceps Kies.

2. N.E.—Scarborough (*R. Lawson*).

Homalium punctipenne Thoms.

2. N.E.—Scarborough (*R. Lawson*).

Homalium rufipes Fourc.

2. N.E.—Saltburn (*M. L. Thompson*) ; Scarborough (*R. Lawson*).

Homalium concinnum Marsh.

2. N.E.—West Ayton, in a flour mill (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Homalium deplanatum Gyll.

2. N.E.—East Ayton, in a haystack bottom (*W.C.H.*).

Eusphalerum primulæ Steph.

1. S.E.—Bridlington Quay (*W.C.H.*).

2. N.E.—Scarborough (*R. Lawson*).

3. N.W.—Ingleton (*J. W. Ellis*).

Anthobium minutum F.

2. N.E.—Lewisham, in flowers of *Geum rivale* (*W.C.H.*). Also recorded from Yorkshire in *Steph. Ill.*, Jan. 1834, and *Steph. Manual*, p. 425.

Anthobium torquatum Marsh.

2. N.E.—Saltburn (*M. L. Thompson*); Hayburn Wyke (*W.C.H.*).

4. CENTRAL VALLEY.—York (*W.C.H.*).

Anthobium sorbi Gyll.

2. N.E.—Saltburn (*M. L. Thompson*).

3. N.W.—Arncliffe (*W.C.H.*).

5. S.W.—Wakefield (*E. B. Wrigglesworth*).

Proteinus brachypterus Er. Locally abundant.

2. N.E.—Saltburn, in fungi (*M. L. Thompson*); Yedmandale, very plentiful (*W.C.H.*).

Proteinus ovalis Steph.

2. N.E.—Saltburn (*M. L. Thompson*).

Megarthrus depressus Lac.

2. N.E.—East Ayton, in haystack bottom (*W.C.H.*).

Megarthrus sinuatocollis Lac.

2. N.E.—Scarborough (*R. Lawson*).

Phlœobium clypeatum Müll.

2. N.E.—Scarborough, in moss (*R. Lawson*).

Phlœocharis subtilissima Mann.

2. N.E.—Scarborough, by beating oaks (*R. Lawson*).

Pseudopsis sulcata Newm.

2. N.E.—Scarborough, in haystack bottoms (*T. Wilkinson, E.M.M.*, Nov. 1868).

3. N.W.—Studley (*E. A. Waterhouse*).

Prognatha quadricornis Lac.

2. N.E.—Scarborough, under bark in Raincliff Wood, scarce (*R. Lawson*).

3. N.W.—Croft (*G. T. Rudd, Curtis, Brit. Ent.*, 1834, xi., 514).

BOTANICAL TRANSACTIONS

OF THE

YORKSHIRE NATURALISTS' UNION.

VOL. IV.

MISCELLANEOUS PAPERS.

BOTANICAL TRANSACTIONS

OF THE

Yorkshire Naturalists' Union.

VOL. I.—*Complete, 8vo., Cloth, with Plate of* Carex saxumbra *v.* leesii, *Price* **6s.** *post free.*

MISCELLANEOUS PAPERS. Including the Moss-Flora of the East Riding (H. FRANKLIN PARSONS, M.D., F.G.S.); Liverworts (Hepaticæ) of the East Riding (RICHARD SPRUCE, Ph.D., F.R.G.S.); The Flora of Ripon and Neighbourhood (Rev. HENRY H. SLATER, M.A., F.Z.S.); The Fathers of Yorkshire Botany (J. GILBERT BAKER, F.R.S., F.L.S.); List of Yorkshire Fungi collected in 1881 (GEORGE MASSEE, F.R.M.S.); The Flora of Dewsbury and Neighbourhood (P. FOX LEE); Reports of the Botanical Section for 1877 (H. FRANKLIN PARSONS, M.D., F.G.S.), for 1878 (*Id.*), for 1879 (W. WEST, F.L.S.), for 1880 (F. ARNOLD LEES, F.L.S.), for 1883 and 1884 (P. FOX LEE), for 1885, 1886, 1887, and 1888 (*Id.*); and Proceedings of the Section.

VOL. II.—*Complete, 8vo., Cloth, with Coloured Map, price* **One Guinea,** *post free.*

THE FLORA OF WEST YORKSHIRE. By FREDERICK ARNOLD LEES, M.R.C.S., etc.

This is perhaps the most complete work of the kind ever issued for any district, including detailed and full records of 1,044 Phanerogams and Vascular Cryptogams, 11 Characeæ, 348 Mosses, 108 Hepatics, 258 Lichens, 1,009 Fungi, and 382 Freshwater Algæ, making a total of 3,160 species.

VOL. III.—(*In progress; nearly complete*).

Second Edition of 'NORTH YORKSHIRE: Studies of its Botany, Geology, Climate, and Physical Geography.' By JOHN GILBERT BAKER, F.R.S., F.L.S. Parts 12, 13, 15, 17, etc.

Of this work four instalments have been already published, price 3/-, 3/-, 1/9, and 1/9 respectively.

VOL. IV.—(*In progress*).

MISCELLANEOUS PAPERS. Including Presidential Address on the Study of Mosses, by ROBERT BRAITHWAITE, M.D., F.L.S., F.R.M.S.

Members are entitled to buy all back numbers and other publications of the Union at **a discount of 25 per cent.** off the prices quoted above.

BOTANICAL TRANSACTIONS

OF THE

YORKSHIRE NATURALISTS' UNION.

VOL. IV.

THE STUDY OF MOSSES.

ROBERT BRAITHWAITE, M.D., F.L.S.,

PRESIDENT OF THE YORKSHIRE NATURALISTS' UNION;

BEING THE

PRESIDENTIAL ADDRESS DELIVERED AT THE ANNUAL MEETING OF THE YORKSHIRE NATURALISTS' UNION, YORK, 30TH OCTOBER, 1895.

In rising to address you, let me first thank you for the honour you have done me in electing me your President for the year, and the opportunity it has afforded me of meeting so many of my native county who have devoted some of their leisure to the pursuit of natural history.

I note by your card that you wisely arrange your work into sections or departments, each occupying a definite field of investigation, for I dare say some of us can look back to the time, years ago, when we thought we could tackle all creation; we collected plants, and beetles, and butterflies, and shells, and sea-weeds, until our homes assumed the condition of museums

in a small way, generally to the upsetting the peace of mind of materfamilias, and not very much to our own edification ; but we were young then, and so was science, and the trumpet notes of Darwin and Wallace's pupils had not sounded through the schools, and taught us that this was not the end of natural history work.

Then came the improvements in the microscope, and the general introduction of that instrument into every branch of biological work, and by this means a new impetus was given to examination, and its area extended indefinitely.

The admirer of the beautiful, and the searcher after knowledge, will find in the investigation of natural objects a soul-satisfying occupation that will accompany him to his life's end, and by eliciting truth often demolishing pet theories, but supplying a solid foundation on which all future knowledge may be built.

Yet I fear something of the old practice still lingers amongst us, for we read now and then of many pounds being paid for a rare moth or shell simply to fill up a gap in a cabinet, and too often the happy possessor knows no more of its life-history than of that of the common companions with which it is placed.

Such being the case it may be pertinent to ask what our thirty-six Societies are doing for the study of the fauna and flora of the biggest county in the kingdom? We have ample variety of woods and valleys, of rocks and mountains, of rivers and sea-coast, and I trust with so many workers, we are adding to our knowledge of its plants and animals, the area and altitude of

their distribution, and relation to each other and to the soil they inhabit; if such be the case, then, I say, keep pegging away with all that northern energy which has made famous so many of our Yorkshire predecessors.

To pass on to particulars—Geology I do not touch upon except to note that in nothing has modern science so upset the older theories than in Geology. Read Dr. Buckland's Bridgewater Treatise, and his account of the awful convulsions this poor earth of ours was supposed to have suffered, or the opinions of Dr. Young of Whitby, and Mr. Bird, both known to me in boyhood, and dear kind souls as ever lived; the glacial epoch was then unknown, and the incalculable age of the early strata a heresy; yet the study of palæontology has thrown a wondrous light on past times and notably strengthened the views of evolutionists by supplying missing links in the chain of organic beings.

In Zoology the Mammalia must occupy a very small corner, but at least three of our societies occupy the sea-coast, and here is a field ever ready to yield a harvest to the enquirer after Fishes, Crustacea, Mollusca, and Polyzoa.

The Insecta will of course be well worked, especially by our younger members, and I would advise that each of our societies should have a cabinet, not for a general collection, but for the local area, say within a radius of 15 miles.

In Botany the same remarks apply, and we should have our local herbarium, but remember that in both cabinets we have but the mummies of a vast army of living things, ticketed and stowed away like old documents for reference and verification,

and their study must be undertaken during life; their elegance of form and colour attract us, but it is by dissection and the study of their development that we gain an insight into their wonderful structure, and the adaptation of parts to the work they have to perform; in a word the mechanism by which the mysteries of life are carried on, and doing so we cease to travel in the narrow groove of mere collectors, and become naturalists indeed.

But who is sufficient for all these things? Just so, and for that reason I advise everyone who means work to confine himself to one division or group, and that I may not be met by the old adage *ne sutor ultra crepidam*, I shall confine the rest of my remarks to that portion of the cryptogamia called Mosses.

The Bryophyta or Mosses are cellular plants, often very insignificant, but occupying a very important place in the economy of nature, and the number of them probably does not fall short of ten thousand species, of which, about eight hundred are natives of our own country. They fall naturally into three divisions,

Bryinæ—True or frondose mosses.
Sphagninæ—Peat mosses.
Hepaticæ—Liver mosses.

the first two are usually combined, but present differences which are well defined and recognisable at a glance, and the frondose mosses being by far the most numerous, I shall confine my remarks to them, and then indicate the points in which the others differ from them.

We will commence with the spore or seed. These are very numerous and extremely minute, resembling brown, yellow, or

reddish dust, which, under the microscope, are seen to be subglobose and smooth, or rough with little tubercles, consisting of a cell filled with plasma and nuclei, enclosed in an outer skin or exospore. You know that seeds of flowering plants germinate only at one point—the embryo—but the spore does so at any part, the skin bursts, and the contents project like a short tube, which, by continuous branching forms a felted layer of transversely septate green threads, termed protonema, often seen in winter as a film coating the soil on wet banks ; from the lower cells of this, by lateral budding, the young moss-plants are produced, from which roots, having oblique septa, proceed downwards, and fix them to the substratum, and except in a few minute species, the protonema then dies away.

The stem now elongates, and lateral cells develop into leaves ; and if we make a transverse section of the stem, we see it has a central pith of long thin cells, external to which the tissue is intermixed with solid or stereid cells, and enclosing all, a thin cylinder of woody cells, which often bear a dense coat of radicles by which the stems are matted together, and moisture is retained. Few mosses have simple stems, but innovations or annual shoots start off below the crown and continue the growth, and occasionally subterranean stolons are thrown out at the root as in *Mnium undulatum* and *Climacium.* Stems are usually erect or creeping, but sometimes they are pendent when growing on trees, or submersed when attached to stones under water.

The leaves are never divided into lobes, and are commonly ovate or lanceolate, but they may be narrowed to an awl-shape,

or expanded into a circle. They are arranged spirally on the stem, and their density depends on the number in each spiral ; when most distant they form two opposite rows, or are distichous, represented by the symbol $\frac{1}{2}$, or two leaves in one circuit ; if tristichous, $\frac{1}{3}$; or the phyllotaxis may be $\frac{3}{5}$ or $\frac{3}{8}$, etc.

If we remove a leaf or two, and place in water on a slide, we find most frequently there is a central mid-rib or nerve, variable in length, and often extending beyond the point as a hair, or there may be two short ones ; the margin may be entire or serrated, or with a thickened border.

We also see that in most species the cells composing the lamina of the leaf are in a single stratum, and that they vary in size and form in different species, but are remarkably constant in the same species ; they are of two principal forms, *parenchymatous* when square, rectangular, or hexagonal, so that the ends are truncate, and *prosenchymatous* when elongated with the ends triangular. The walls of cells often become thickened by internal deposit, so that they appear like round dots, and are termed incrassate, and pores in the walls also enable adjacent cells to communicate. The external face of the leaf-cells may also be the seat of local deposit and we get papillæ or warts formed, and occasionally the nerve presents out-growths in form of laminæ or filaments.

The reproductive organs are arranged in what are usually called flowers, a term scarcely applicable, and for which I use that of inflorescence ; this varies in position and constitution, and is often so small as to be found with difficulty; it is terminal when it ends in the main axis, and the small leaves enclosing

the sexual organs are called bracts ; when the male and female elements are united in one inflorescence, it is termed synoicous ; when separate, and on the same plant, autoicous ; and when on different plants, dioicous. The male inflorescence may be gemmiform, or like a little bud in the axil of a leaf or branch, or when terminal it may be capitate or discoid, the latter well seen in the common *Polytrichum piliferum* of our moors, conspicuous by the crimson colour of the bracts. The male organs or antheridia are sausage-shaped, and usually accompanied by jointed filaments called paraphyses, and at maturity the antheridium bursts at the apex and gives exit to the fertilizing element the antherozoids, minute spirally coiled clavate threads, each having two long vibratile cilia at the small end.

The female organs or archegonia are flask-shaped, tapering upwards into a long style, and the lower part is occupied by a large cell—the oosphere—corresponding to the ovary of higher plants.

When mature, the cells in the axis of the style become dissolved, and the apical cells rupture and roll back, the active antherozoids enter the canal and pass down to the oosphere, which they enter and then disappear, the contents are fertilized, and the oosphere becomes an oospore, and at once commences active growth by cell-division, the lower end pushes down into the tissue beneath the archegone, and the upper elongates into a pedicel, bearing at its apex the young sporogone or capsule covered by the calyptra, for as the ventral portion of the archegone enlarges it ruptures near the base, the lower part forming the vaginula or little sheath enclosing the base of the fruit-stalk,

the upper, the calyptra, which is expanded by the growing capsule, and it is only when the seta has attained its full length that the capsule begins to enlarge and form spores; the seta is of firm consistence, and smooth or rough with small nodules, and its length varies greatly.

The calyptra protects the young capsule and is constant in form, commonly cucullate or dimidiate when oblique, and split up on one side, or mitriform when erect, regular and slit into several lobes; in a few it is shaped like an extinguisher, and occasionally the mouth is fringed; the surface is smooth or hairy, papillose or spinulose.

The full-grown capsule, theca, or sporangium may be regular or symmetric, or it may be irregular or unsymmetric, and its form is very variable, pear-shaped, globose, oblong, cylindric, or angular, and in direction erect, drooping, or pendulous; the surface has an epidermal layer of flat empty cells, generally furnished with stomata, by which communication is maintained between the atmosphere and the interior of the capsule; these stomata have two guard-cells, and they are also found on some leaves. A flask-like enlargement is sometimes seen below the capsule, called the hypophysis, notably in the Splachnaceæ, in which it is much larger than the capsule itself.

The capsule is a most important organ, and extremely beautiful in structure, and perhaps we shall get the best idea of its formation by a section. We see that it consists of an external wall of several layers of cells, next to this an air-cavity, often bridged across by small cellular ropes or threads reaching to the

spore-sac, and in the centre the columella, to which the spore-sac is generally closely applied.

If we take a capsule when the calyptra is just cast off, we see that the upper end is closed by a lid or operculum, flat, conical, or with a long beak, by the falling away of which, exit is given to the spores, but in a few ill-developed mosses, we find no line of dehiscence for the separation of a lid, and hence these were formerly grouped together as cleistocarpous or closed-fruited mosses, and the spores only escaped when the capsule rotted. Now these lowly specimens are referred to the families with which they agree in habit and leaf structure, and we look upon them as imperfectly developed mosses.

Between the capsule mouth and the lid is usually an annulus or ring of several rows of vesicular cells, which swelling by moisture, act as wedges, and lift up the lid, by the removal of which the peristome comes into view, a series of jointed teeth guarding the capsule-mouth, which are always multiples of 4, being 4, 8, 16, 32, or 64.

The species with four teeth are represented here by two species of *Georgia*, and the teeth consist of four pyramidal masses of cells composing the internal tissue of the lid. Another considerable family, the Polytrichaceæ, have sixteen, thirty-two, or sixty-four peculiar teeth formed of bundles of fine threads united by cellular tissue into flat plates, the point of the teeth being bound down to the circular dilated top of the columella which closes the mouth, and is termed the epiphragm or tympanum. In most other mosses the teeth, when most highly developed, are formed of thickened plates in two strata, the

outer layer is composed of two rows of cells jointed together transversely, firm and often richly coloured, brown, yellow, red, etc., but on the inner surface of the tooth we find only one layer of cells, which are thin and vesicular, and their adjacent walls are thickened into transverse plates or lamellæ.

See now how this difference in structure acts; the thin internal cells absorb water quickly, and consequently swell up and shorten the inner face of the tooth, to which the hard outer cells can only yield at the transverse joints, and they thus bend inward and shut up the mouth of the capsule, and this trivial thing, as we may consider it, puts in action the teeth of thousands of moss capsules every rainy day, and forms an important phase in their life-history.

At base the peristome cells are united to the innermost layer of the capsular wall; but this is not all, for in these higher mosses, *Bryum*, *Mnium*, *Hypnum*, etc., within the peristome is a series of appendages, the inner peristome or endostome, a delicate membrane, continuous with the outer layer of the spore-sac, and prolonged into sixteen processes, alternating with the outer teeth, and commonly perforated in the middle line, also having one to four slender cilia between each pair of processes.

In *Buxbaumia* and *Webera* the endostome forms a plicate tube, in *Cinclidium* the processes are united at top into a beautiful dome, and in *Fontinalis* they form a crimson ladder by means of transverse cross-bars. Of course when the lid comes away the spore-sac is ruptured and the spores are scattered; this must be effected by the wind when the peristome is ill-developed, as we may notice that in most of these the capsule is erect, but in

Mnium, *Bryum*, and *Hypnum*, the capsule is usually drooping, and when the peristome is closed by moisture, the spores must await a drier interval for dispersion.

The columella is the central pillar of the capsule continued from the central cells of the seta to the tissue of the lid.

In many mosses, when the lid comes off no trace of a peristome is to be seen, and they are said to be gymnostomous, and when genera of mosses were founded on the number of teeth in the peristome, all those in which the peristome was absent were lumped together in one genus *Gymnostomum*, although differing widely in habit and leaf-structure. We now regard these as the lowest forms of such peristomate genera as they agree with in general structure. Taking these highest forms we find the first parts to be lost are the cilia, and then all the endostome, next the inner layer of cells in the teeth of peristome, which thus become rigid and imperfect, these also disappear, and the capsule is gymnostomous, and last of all, it cannot even produce a decent lid. Such is a brief outline of the structure of the true mosses, and I may deal with the other two groups by just indicating the chief points in which they differ from them.

The Sphagna or Peat-mosses comprise probably a hundred closely allied plants, possessing a very uniform aspect, differing considerably from that of the Bryinæ, and inhabiting almost exclusively moorland bogs, in which they form great spongy masses, and are also independent of roots.

The stem has a distinct pith, the external layers are indurated, and generally coloured brown or red, and coated by a loose cuticle of empty vesicular cells in one to four strata.

The branches are in fascicles or bundles of four to twelve in each, part of them spreading outward, and part of them pendent and closely applied to the stem. The leaves are always nerveless, and consist of two very different kinds of cells, first, large empty vesicular cells, having the walls perforated with circular holes, and on the internal wall fine fibrils wound round in spirals or rings, just like the hoops in a lady's crinoline, to keep it expanded; secondly, slender tubular cells filled with chlorophyl placed between and around the large vesicular cells, and the relation of these cells to each other is of great importance in the discrimination of species; this is seen by transverse section of the leaf, when the chlorophyl cells appear between the vesicular, either lenticular, if placed centrally, or bluntly triangular with the base projecting either at the dorsal or ventral surface. The male inflorescence is packed on the upper branches which thus become clavate and colored, the antheridia being globose, stalked, and standing singly by the side of each bract.

The archegonia resemble those of mosses, and the capsule is enclosed in a large saccate calyptra, and afterwards elevated on a naked branch; in shape it is globose, with a flat lid and no trace of peristome. The great uniformity in habit renders it difficult to define species, and there is a tendency at present to largely multiply them, though all of them vary exceedingly.

The Hepaticæ differ still more widely from mosses, although some species are often mistaken for them, and their simpler structure shows that they are of lower organization. Besides the leafy species a number remain in the thalloid state, that is,

form a horizontal expansion without a stem or leaves, of which the common *Marchantia* is an example.

The majority, however, constituting the Jungermanniaceæ, have a branching stem and leaves, the latter being often cut or lobed, or having little pouches on the margin, and they are usually arranged in two opposite rows, frequently with another series of different form clasping the under-side of the stem.

The capsule differs widely from that of mosses, being globose or oval, without lid or peristome, and splitting into four valves, and the seta at base is fixed in an inflated cup or calyx; the spores also are accompanied with elaters, long thin hyaline cells, on the interior of which run one to three spiral bands.

The thallose section varies more in the fruit; in *Marchantia* the seta bears a radiate disc, on the under side of which are bi-labiate perichætia, enclosing the sporogones, the male disc is bluntly stellate, in the upper surface of which the antheridia are immersed. *Riccia* and a few more have the reproductive organs embedded in the substance of the frond.

We have been considering these plants as developed from spores, but where no fruit is produced there are other modes of propagation which ensure the continuance of the species; thus, tubercles on the roots, gemmæ on the stem or leaves, or even a fallen leaf are all capable of producing protonema and new plants.

In collecting mosses we do not put them loose into the vasculum, but wrap each specimen in paper, then, as soon as we can, we prepare them for the herbarium by soaking in water until they are expanded, washing out dirt, and separating into

nice patches which may be pressed, first between the hands, then in a folded towel, then laid out on drying paper and kept under gentle pressure for a few days; when dry, one may be mounted on a square of paper and others put loose in a square folded case, and these may be mounted on a sheet and kept in covers. Some botanists keep all their specimens loose, but I would not advise what some use—letter envelopes—as in taking them in and out, they are sure to get broken. The best collecting ground is in mountain districts where rocks and streams abound, but woods, old walls and trees have all their special tenants. Remember also when collecting, always choose good specimens, and also plenty of them, for many who are interested in these elegant plants may have but little opportunity to gather them, and others who have, may yet add to their collection by exchange with their friends; kept in a dry place, they may be preserved good for centuries.

I thank you for your kind attention, and will conclude as I began. To all I say work while it is yet day, for night cometh when no man can work; work so well that your works may follow you, and the generation yet for to come may haply complete them all, and when there are no more mosses to discover

Then singing on, triumphing
These old earth mansions through,
Out marches the last Yorkshire Naturalist,
He is the last man too.

OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1891.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, M. Inst. C.E. retired., F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, M. Inst. C.E., F.R.Met.Soc., F.G.S.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

MONTHS.	PRESSURE OF ATMOSPHERE IN MONTH.											TEMPERATURE OF AIR IN SHADE DURING MONTH.																								VAPOUR.																					
										Corrected for Capillarity and Temperature.		In Each Month.							Daily Mean.									Adopted Mean Temperature.																									
																				In Each Month.				Range.		Of Dry Bulb.		Of Air.		Of Evaporation.		Dew Point.		Elastic Force.		In a Cubic Foot of Air.															
	Highest Reading of Barometer.	Date.	Highest during 23 Years.	Mean of Highest of 23 Years.	Lowest Reading of Barometer.	Date.	Lowest during 23 Years.	Mean of Lowest of 23 Years.	Range.	Mean.	Mean of 23 Years.	Highest.	Date.	Highest during 23 Years.	Mean of Highest of 23 Years.	Lowest.	Date.	Lowest during 23 Years.	Mean of Lowest of 23 Years.	Range.	Of all Highest.	Mean of 23 Years.	Of all Lowest.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.	Mean.	Mean of 23 Years.
	Ins.	On	Ins.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Deg.	On	Deg	Deg.	Deg.	On	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
January	30·308	14th	30·544	30·181	29·012	23rd	28·070	28·693	1·296	29·654	29·595	51·0	30th	57·2	52·9	12·0	19th	6·7	23·2	39·0	40·4	43·0	31·5	34·4	8·9	8·7	37·0	39·2	36·4	38·8	34·6	37·1	32·0	34·8	·182	·204	2·1	2·4	0·5	0·4	554	549	98	2nd	100	97	41	19th	34	65	85	86
February	30·356	4th	30·412	30·104	29·580	26th	28·402	28·835	0·776	30·015	29·540	53·0	4th	59 8	53·4	27·6	26th	19·2	26·5	25·4	44·7	44·2	35·6	35·3	9·1	8·8	39·5	39·6	39·6	39·5	38·0	37·7	35·9	35·4	·211	·208	2·4	2·4	0·4	0·4	557	548	100	20th	100	97	63	12th	42	65	87	86
March	29·858	3rd	30·476	30·128	28·990	16th	28·175	28·784	0·868	29·377	29·488	53·3	2nd	66 0	56·8	27·0	9th	17·4	25·8	26·3	44·2	46·3	34·3	35 3	9·9	11·0	38·7	40·4	38·5	40·1	36·2	37·7	33·1	34·7	·189	·203	2·2	2·3	0·6	0·5	547	547	96	16th	99	96	47	12th	28	56	82	83
April	29·988	20th	30·500	30·060	29·186	5th	28·332	28·852	0·802	29 582	29·475	54·6	27th	74·0	63·4	31·1	7th	27·4	31·4	23·5	47·7	52·2	36·5	39·3	11·2	12·9	41·6	44·5	41·1	44·5	37·9	41·1	33·9	37·2	·195	·225	2·3	2·6	0·7	0·8	548	541	97	4th	100	95	47	19th	30	52	76	77
May	29·946	12th	30 362	30·049	28·948	1st	28·661	29·030	0·998	29·375	29 537	72·9	13th	83·9	70·4	28·6	18th	28·6	34·9	44·3	55·2	58·3	42·2	43·9	13·0	14·4	48·1	49·6	47·6	49·5	43·9	45·2	39·8	41·0	·246	·259	2·8	3·0	0·9	1·1	536	537	97	1st	99	92	43	6th	30	44	75	73
June	30·084	20th	30 300	30·025	29·350	30th	28 840	29·171	0·734	29·639	29·564	74·1	27th	87·8	76·9	42·0	1st	38·0	41·9	32·1	65·5	65·1	50·8	50·1	14·7	15·0	57·1	55·9	56·7	55·8	52·4	51·3	48·4	46·9	·341	·322	3·8	3·6	1·3	1·4	531	531	93	6th	100	93	47	11th	32	48	74	72
July	30·008	14th	30·305	29·972	29·200	7th	28·690	29·147	0·808	29·475	29·509	78·0	18th	89·6	79·4	49·0	29th	49·0	46·5	29·0	6·0	68·0	53·3	55·8	12·7	14·3	58·5	60·0	58·2	59·7	52·5	54·1	47·4	49·8	·328	·360	3·7	4·0	1·8	1·7	527	526	97	30th	99	91	37	17th	35	48	68	70
August	29·728	7th	30 242	29·989	28 990	27th	28 670	29·057	0·738	29·312	29·496	69·5	19th	85·2	78·0	46·2	30th	38·6	45·2	23·3	62·4	66·8	52·8	53·0	9·6	13·8	57·2	58·7	58·5	58·5	52·4	53 9	48·6	50·0	·343	·362	3·9	4·1	1·2	1·4	525	527	95	6th	99	92	48	18th	41	51	75	74
September	29·938	16th	30·232	30·081	28·884	1st	28 452	29·006	1·054	29·516	29·521	79·9	12th	91 3	71·1	48·0	22nd	33·5	40·1	33·9	64·8	62·1	51·8	49·7	13·0	12 4	1·7·0	54·7	57·0	54·8	52·8	51·4	48·9	48·1	·346	·337	3·9	3·8	1·3	1·0	529	531	99	6th	99	95	40	10th	38	54	74	78
October	30·394	31st	30 394	30 132	28·610	13th	28·250	28·737	1·784	29·259	29·451	62·9	8th	69 9	63·2	36·0	25th	26 7	32·6	26·9	55·0	53·8	44·2	43·3	10·8	16 5	49·0	48·2	48·8	47·9	46·0	45·5	43·0	42·7	·278	·276	3·1	3·1	0·7	0·7	533	537	97	4th	99	97	60	9th	49	61	80	83
November	30·376	5th	30·376	30 058	28·060	11th	26·080	28·653	2·316	29·399	29 443	56·0	19th	61·5	56·4	28·5	28th	23·0	28·6	27 5	46·8	47·3	38·8	38·4	8·0	9·0	42 4	42·8	42·4	42·5	40·3	40 3	37·8	37·5	·227	·225	2·6	2 6	0·5	0 6	542	543	99	1st	100	96	69	19th	43	64	84	83
December	30·270	21st	30·358	30 120	28·588	10th	27·652	28 677	1·682	29·449	29·477	56·0	4th	57 8	53·1	16·1	25th	13·2	23·0	39·9	44·3	42·7	33 9	34·1	10·4	8·5	39·8	39·0	39·4	38·7	37·6	36·7	35·3	34 2	·206	·199	2·4	2·3	0·5	0·5	547	548	97	25th	100	97	51	5th	44	64	86	84
Means, or totals..	30·105		30·376	30·073	28·950		28·354	28·887	1·155	29·504	29·502	63·4		72·8	64 6	32·5		26·2	33·3	30 9	53·1	54·2	42·1	42·6	11·0	11·6	47 2	47·7	46 9	47·5	43·7	44·3	40·3	41·0	·258	·265	2·9	3·0	0·9	0·9	540	539	97		100	95	49		37	56	79	79

MONTHS.	BRIGHT SUNSHINE.				TEMP. OF AIR IN SUN'S RAYS.			WIND.																				RAIN.							
								Direction: Relative Proportion of at 9 a.m.								Velocity.						Pressure.															
	Greatest Daily Duration.	Date.	Total of Month.	Per cent. of Possible Duration.	Highest.	Date.	Mean.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	At 9 a.m. Mean.	At 9 a.m. Highest.	Date.	During 24 hours. Mean.	During 24 hours. Highest.	Date.	Total Registered in Month.	Mean of all Daily Highest.	Mean of all Daily Highst. of 8 Year	Highest.	Direction.	Date.	Mean of Highest of Month of 8 Years.	Mean Amount of Cloud.	Number of Days It fell.	Greatest Daily Fall.	Date.	Amount Collected.	Mean of 22 Years.	Mean of Seven Years ending with 1892, 65½ft. above surface of ground.	Mean of 7 Yrs. endg. with 1891 at Tn. Hall and Mid. Rg. Station on surface of ground.	Depth in Inches.	Percentage of fall at Exch'ge
	hr. min.	On	hr. min.		Deg.	On	Deg.	No.	No.	No.	No.	No.	No.	No.	No.	Miles p'r hr.	Miles p'r hr.	On	Miles per d.	Miles per d.	On	Miles.	lb. per sq. ft.	lb. per sq. ft.	lb. per sq. ft.		On	lb. per sq. ft.	0—10	No.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Per cent.
January	2 45	23rd	12 50	5	73·0	28th	55·0	3	5	0	2	2	9	2	8	6·4	17·0	20th	144	348	27th	4484	1·88	2·89	7·50	S W	27th	12·09	8·1	15	0·66	21st	1·63	2·62	2·209	2·474	0·265	11·2
February	6 0	16th	21 20	8	84·0	12th	63·1	5	1	0	1	2	5	5	9	3·2	11·8	11th	94	246	12th	2643	1·31	2·54	10·75	S W	12th	9·62	9·3	0	0·00	—	0·00	1·74	2·609	2·972	0·363	11·4
March	8 30	28th	79 30	22	99·0	30th	74·9	5	6	2	0	1	1	10	6	8·7	24·0	5th	183	559	6th	5672	2·92	2·33	10·00	W	6th	9·75	7·5	17	0·23	16th	1·22	2·16	2·776	3·260	0·484	11·7
April	7 30	24th	60 20	14	98·0	15th	76·7	5	8	8	3	1	1	4	0	6·9	12·0	3rd	132	218	3rd	3968	1·67	2·22	6·00	W	17th	7·72	8·2	12	0·47	5th	1·51	2 05	2·516	2·835	0·319	11·2
May	11 45	12th	104 55	21	107·0	30th	90·6	3	6	3	1	3	5	6	4	5·9	12·4	2nd	130	228	2nd	4042	1·63	2·12	4·00	S W	2nd	7·41	7·1	22	0·29	24th	2·53	1·86	2·103	2·277	0·174	10·8
June	10 0	12th	95 5	19	104·8	22nd	100·2	5	5	6	2	1	6	2	3	6·9	14·4	27th	150	241	14th	4490	1·62	1·57	3·50	W	14th	6·28	7·1	8	0·65	5th	1·03	2·21	2·837	3·011	0·174	10·6
July	11 0	28th	145 15	29	107·0	27th	101·1	4	1	0	0	4	6	11	5	6·5	10·4	15th	140	216	7th	4341	1·73	1·89	5·00	S W	7th	6·75	7·2	15	0·29	2nd	1·80	2·89	3·401	3·641	0·240	10·7
August	9 15	19th	80 5	20	105·0	3rd	96·4	4	0	2	1	2	10	7	5	6·7	15·8	26th	148	493	26th	4603	2·34	1·67	13·50	S W	26th	7·59	8·2	22	0·65	18th	4·02	2·69	3·654	3·892	0 238	10·7
September	8 15	13th	110 5	29	107·0	13th	93 6	4	0	1	0	5	10	10	0	8·3	19·8	6th	161	309	1st	4841	2·00	1·90	5·25	S W	2nd	6·19	6·3	18	0·58	20th	2·04	2·61	2·894	3·229	0·335	11·2
October	5 50	8th	62 0	19	99·4	1st	79·7	5	2	6	0	5	9	3	1	8·1	17·3	14th	165	306	17th	5127	1·97	2·25	6·50	S W	16th	8·41	6·9	21	0·64	14th	3·67	3·43	3·640	4·012	0·372	11·0
November	3 0	1st	12 55	5	76·0	1st	60·8	5	4	10	0	4	3	3	1	5·7	13·4	12th	134	321	12th	4009	1·40	2·26	8·50	S W	12th	9·34	8·2	20	0·48	11th	2·96	2·91	3·421	3·828	0·407	11·2
December	2 50	15th	11 15	5	70·0	6th	57·6	6	0	2	2	4	5	10	2	8·2	18·0	3rd	165	326	11th	5115	2·20	2·48	8·00	S W	6th	9·62	8·2	20	1·02	10th	4·89	2·67	3·681	4·170	0·489	11·3
Means, or totals..	7 13		805 35	18	94·2		79·1	54	38	40	12	34	70	73	44	6·5	15 5		148	318		53315	1·88	2·16	7·29			8·31	7·7	190	0·50		27·30	29·84	35·741	39 601	3·860	11·08

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1891.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	Pressure. Highest. Reading of Baroms. during Year.	Pressure. Highest. Date.	Pressure. Lowest. Reading of Baroms. during Year.	Pressure. Lowest. Date.	Temperature. In Shade. Highest. R'ding of Maximum Thermom. during Yr.	Temperature. In Shade. Highest. Date.	Temperature. In Shade. Lowest. R'ding of Minimum Thermom. during Yr.	Temperature. In Shade. Lowest. Date.	Temperature. Last and First Frost of Seasons. Date of Last Frost.	Temperature. Last and First Frost of Seasons. Date of First Frost.	Temperature. In Sun's Rays. Highest. Reading of Solar Thermom. during Yr.	Temperature. In Sun's Rays. Highest. Date.	Humidity. (Complete Saturation = 100.) Highest. Degree of Humidity during Yr.	Humidity. Highest. Date.	Humidity. Lowest. Degree of Humidity during Yr.	Humidity. Lowest. Date.	Bright Sunshine. Greatest Daily Duration.	Bright Sunshine. Date.	Bright Sunshine. Total of Year.	Bright Sunshine. Per cent. of Possible Duration.	Wind Pressure. Highest.	Wind Pressure. Date.	Rain. Total for Year	Rain. Mean Y'ly Rainfall at Town Hall and Mid. Stn. on surface of Grd.	Rain. Grtr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc'ge. Depth in Inches.	Rain. Grtr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc'ge. Percentage of fall at Exch'ge	Rain. Greatest Daily Fall during Yr.	Rain. Date.	Snow. Last and First Snow of Seasons. Date of Last Snow.	Snow. Last and First Snow of Seasons. Date of First Snow.
	Ins.		Ins.		Deg.		Deg.				Deg.		0—100		0—100		hr. min.		hr. min.		lb. per sq. ft.		Ins.	Ins.	Ins.	Per cent.	Ins.			
1869	30·290	Dec. 6	28·500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	April 3	Oct. 19
1870	30·284	Jan. 19	28·308	Jan. 8	86·0	July 25	16·6	Dec. 23	Mar. 30	Nov. 9	127·5	July 25	98	Jan. 29	28	Mar. 8	.....	.....	.....	.....	.....	.....	24·120	.....	.....	.....	0·820	June 18	Mar. 24	Nov. 15
1871	30·162	Mar. 28	28·308	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2	.....	.....	.....	.....	.....	.....	21·640	.....	.....	.....	0·985	June 16	Mar. 15	Nov. 16
1872	30·156	April 6	28·070	Jan. 24	86·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23	.....	.....	.....	.....	.....	.....	42·060	.....	.....	.....	2·490	June 19	May 11	Nov. 13
1873	30·338	Feb. 18	28·022	Jan. 20	88·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26	.....	.....	.....	.....	.....	.....	21·440	.....	.....	.....	1·200	Aug. 4	April 25	Jan. 3, '74
1874	30·476	Mar. 6	28·276	Dec. 11	80·9	July 20	16·0	Dec. 31	Mar. 12	Nov. 11	125·8	July 20	100	Feb. 6	42	May 18	.....	.....	.....	.....	.....	.....	23·560	.....	.....	.....	0·740	Dec. 7	May 9	Nov. 26
1875	30·305	July 7	28·484	Nov. 10	80·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6	.....	.....	.....	.....	.....	.....	30·280	.....	.....	.....	1·700	Nov. 15	Mar. 12	Nov. 9
1876	30·300	Jan. 15	28·070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 5	.....	.....	.....	.....	.....	.....	35·270	39·788	4·518	11·28	1·810	Oct. 9	April 12	Nov. 8
1877	30·358	Oct. 6	28·300	Nov. 29	80·0	June 19	20·0	Mar. 1	May 4	Oct. 18	116·4	June 19	100	Oct. 29	35	May 23	.....	.....	.....	.....	.....	.....	40·650	45·499	4·849	11·19	1·420	July 16	May 19	Oct. 15
1878	30·320	Mar. 16	28·630	April 1	89·6	July 19	13·9	Dec. 26	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9	.....	.....	.....	.....	.....	.....	35·434	39·010	3·576	11·01	1·220	Aug. 14	April 1	Nov. 8
1879	30·352	Dec. 13	28·500	Feb. 10	74·4	July 30	13·2	Dec. 7	May 10	Nov. 14	101·2	Aug. 13	100	Oct. 7	51	Dec. 12	.....	.....	.....	.....	.....	.....	28·017	30·298	2·281	10·82	1·020	June 8	May 7	Nov. 20
1880	30·332	Jan. 7	28·154	Nov. 16	81·3	Sep. 5	20·8	Jan. 20	Feb. 23	Oct. 20	112·0	Aug. 13	99	Dec. 15	50	May 30	.....	.....	.....	.....	.....	.....	35·690	39·616	3·926	11·10	1·710	Oct. 27	Mar. 2	Oct. 27
1881	30·382	May 10	28·260	Oct. 14	83·3	July 6	12·0	Jan. 26	April 21	Oct. 17	116·5	June 1	98	Oct. 14	38	May 31	.....	.....	.....	.....	.....	.....	35·434	39·892	4·458	11·26	1·435	Oct. 13	April 20	Oct. 29
1882	30·544	Jan. 18	28·452	Mar. 1	77·4	Aug. 12	18·6	Dec. 11	April 16	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18	.....	.....	.....	.....	.....	.....	39·683	43·103	3·420	10·86	1·608	Dec. 6	Mar. 21	Nov. 19
1883	30·500	April 9	28·452	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9	.....	.....	.....	.....	.....	.....	34·396	.....	.....	.....	1·338	Sep. 26	Mar. 24	Nov. 10
1884	30·354	Oct. 5	28·376	Jan. 27	84·4	Aug. 12	26·5	Nov. 30	April 24	Nov. 24	107 8	Aug. 9	98	Jan. 23	30	May 22	.....	.....	.....	.....	24·00	Jan. 24	27·657	.....	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1885	30·273	Mar. 14	28·400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 16	113·6	July 27	100	Jan. 23	32	June 4	.....	.....	.....	.....	15 25	Dec. 4	25·699	.....	.....	.....	1·208	Sep. 3	May 7	Dec. 9
1886	30·355	Nov. 24	27·652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108 8	July 5	99	Jan. 12	32	May 4	11 45	July 6	851 48	19	18 00	Dec. 9	36·983	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1887	30·412	Feb. 8	28·328	Nov. 3	82·8	July 9	21·1	Jan. 17	April 17	Oct. 12	107·6	July 9	100	April 21	35	July 9	12 40	July 3	1120 58	25	15·00	Feb. 4	18·865	.....	.....	.....	0 810	Oct. 9	May 21	Oct. 14
1888	30·333	Jan. 10	28·410	Mar. 28	80·4	June 27	19·2	Feb. 14	April 8	Oct. 2	110·0	Sep. 15	99	Mar. 15	39	June 11	13 40	May 24.	984 20	20	13·00	May 4	25·646	.....	.....	.....	1·050	Nov. 3	April 8	Oct. 1
1889	30·358	Dec. 5	28·460	Mar. 20	77·5	Aug. 1	21·3	Mar. 4	Mar. 22	Nov. 27	115·2	June 23	99	April 22	39	June 26	12 15	July 8	827 45	18	12·00	Feb. 9	22·141	.....	.....	.....	0 590	Mar. 9	Mar. 21	Nov. 25
1890	30·376	Feb. 23	28·315	Jan. 23	76·4	Sept. 10	18·4	Dec. 22	Mar. 10	Oct. 28	111·0	June 16	99	May 11	31	May 29	14 25	May 25	824 5	18½	14 0	Jan. 19	25 730	.....	.....	.....	1 485	Jan. 22	April 13	Oct. 21
1891	30·394	Oct. 31	28·060	Nov. 11	79·9	Sept 12	12 0	Jan 19	May 18	Nov. 25	107 0	July 27	100	Feb. 20	37	July 17	11 45	May 12	805 35	18	13·50	Aug. 26	27·303	.....	.....	.....	1·020	Dec. 10	May 17	Nov. 26
Means	30 345		28·295		81·9		18·0				116·0		99		39		12 45		885 45	20	16·59		29 841	39·601	3·860	11·08	1 316			

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8.40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

Bright sunshine is recorded in hours and minutes by glass sphere on cards, known as Campbell's recorder, fixed on Professor Stokes' zodiacal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 9 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the twenty-two years ending with 1891 is 29·841 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 33·147 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1892.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, M. Inst. C.E. retired., F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, M. Inst. C.E., F.R.Met.Soc., F.G.S.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

Months.	Pressure of Atmosphere in Month.										Temperature of Air in Shade during Month.																						Vapour.																					
											In Each Month.						Daily Mean.										Adopted Mean Temperature.																							
																	In Each Month.				Range.		Of Dry Bulb.		Of Air.		Of Evaporation.		Dew Point.		Elastic Force.		In a Cubic Foot of Air.				Mean Weight of a Cubic Foot of Air.	Mean of 24 Years.	Degree of Humidity. (Complete Saturation = 100.)											
	Highest Reading of Barometer.	Date.	Highest during 24 Years.	Mean of Highest of 24 Years.	Lowest Reading of Barometer.	Date.	Lowest during 24 Years.	Mean of Lowest of 24 Years.	Range.	Corrected for Capillarity and Temperature. Mean.	Highest.	Date.	Highest during 24 Years.	Mean of Highest of 24 Years.	Lowest.	Date.	Of all Highest.	Mean of 24 Years.	Of all Lowest.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Mean of 24 Years.	Mean.	Short of Saturation.	Mean of 24 Years.		Highest.	Date.	Highest during 24 Years.	Mean of Highest of 24 Years.	Lowest.	Date.	Lowest during 24 Years.	Mean of Lowest of 24 Years.	Mean.	Mean of 24 Years.
	Ins.	On	Ins.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Deg.	On	Deg.	Deg.	Deg.	On	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Ins.	Ins.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	0—100	On	0 -100	0—100	0 100	On	0—100	0—100	0—100	0—100
January	30·080	25th	30·544	30·176	28·904	6th	28 070	28·702	1·176	29·39	29·520	51·0	30th	57·2	52·8	21·8	16th	6·7	23·1	29·2	40·2	42·9	32·3	34·3	7·9	8·6	36·8	39·1	36·5	38·7	34·8	37·0	32·3	34·7	·184	·203	2·1	2·3	0·4	0·4	549	549	99	12th	100	97	60	7th	34	65	86	86
February	30·290	13th	30·419	30·108	28·639	2nd	28 462	28·827	1·587	29·342	29·532	50·4	8th	59 8	53·2	18·8	19th	16·8	28·1	31·6	42·9	44·1	34·0	35·2	8·0	8·8	37·4	39·5	37·5	39·4	36·0	37·7	34·0	35·4	·195	·208	2·3	2·4	0·4	0·4	547	548	98	24th	100	97	57	18th	42	65	87	86
March	30·258	30th	30·476	30·133	28·892	15th	28·175	28·788	1·364	29·649	29·495	59·8	19th	66 0	56·9	21·2	12th	17·4	25·6	38·6	42·8	46·2	31·8	35 2	11·0	11·0	37·2	40·3	36·8	39·9	34·0	37·6	30·0	34·5	·167	·201	1·9	2·3	0·7	0·5	554	547	96	28th	99	96	35	31st	28	55	76	82
April	30·126	1st	30·500	30·062	29·178	27th	28·332	28·866	0·948	29·602	29·480	64·5	3rd	74·0	63·5	25·0	19th	25·0	31·1	39·5	52·6	52·3	37·0	39 2	15·6	13·0	42·7	44·5	43·0	44·4	39·7	41·1	35·7	37·2	·210	·224	2·4	2·6	0·8	0·8	546	542	97	18th	100	95	32	3rd	30	51	76	77
May	≤0·240	11th	30 382	30·057	29·180	16th	28·661	29·036	1·060	29·571	29·539	68·8	31st	83·9	70·4	34·7	1st	28·6	34·9	34·1	58·3	58·3	45·4	43·9	12·9	14·4	51·8	49·7	51·0	49·5	47·4	45·3	43·6	41·1	·285	·260	3·2	3·0	1·0	1·1	536	537	96	16th	99	92	44	31st	30	44	76	73
June	30·102	8th	30 300	30·029	29·250	2nd	28 840	29·174	0·852	29·565	29·564	76·6	1st	87·8	76·9	39·4	18th	38·0	41·8	37·2	6·3	65·0	49·0	50·1	13·3	14·9	54·6	55·8	54·2	55·7	50·0	51·3	45·9	46·9	·308	·322	3·5	3·6	1·3	1·4	533	531	97	16th	100	93	42	8th	32	48	73	72
July	30·046	24th	30·305	29·977	29·168	19th	28 690	29·148	0·9 8	29·608	29·513	76·0	5th	89·6	79·3	45·4	18th	42·0	46·5	30·6	63·3	67·8	51·7	55·7	11·6	14·1	56·6	59·8	56·1	59·6	51·9	54·0	47·9	49·8	·336	·359	3·8	4·0	1·3	1·7	531	526	96	5th	99	91	49	8th	35	48	74	70
August	29·938	10th	30 2·2	29·968	29·046	30th	28 670	29·057	0·892	29·468	29·495	77·0	24th	85 2	77·9	44·2	10th	38·6	45·2	32·8	65·5	66·8	53·5	53·0	12 0	13·7	58·4	58·7	58·1	58·5	54·1	53·9	50·5	50·0	·368	·362	4·1	4·1	1·3	1·4	526	527	94	18th	99	92	49	4th	41	51	76	74
September	29·956	5th	30·232	30·076	29·052	30th	28 452	29·006	0·904	29·499	29·520	65·4	11th	81·3	70·9	42·9	29th	33·5	40·2	22·5	60·0	62·0	48·7	49·7	11·3	12 3	53·7	54·7	53·4	54·8	50·1	51·4	46·8	48·0	·320	·336	3·6	3·8	1·0	1·0	532	531	94	19th	99	95	56	17th	38	54	78	78
October	29·970	18th	30·394	30 125	28·764	29th	28 250	28·739	1·186	29·305	29·445	58·2	29th	69 9	63·0	28·6	26th	26·7	32·4	29·6	50·3	53·7	39·9	43·2	10·4	10·5	44·6	48·1	44·4	47·7	41·8	45·3	38·7	42·5	·236	·274	2·7	3·1	0·6	0·6	539	537	98	9th	99	97	54	13th	49	61	80	83
November	30·078	22nd	30·376	30·059	29·214	3rd	28·060	28·676	0·864	29·608	29·450	56·5	15th	61·5	56·4	30·0	2nd	23·0	28·6	26·5	48·1	47·4	40·1	38 4	8·0	8·9	44·1	42·8	43·9	42·5	41·9	40·3	39·6	37·6	·244	·226	2·8	2 6	0·5	0 5	545	543	98	21st	100	97	65	29th	43	64	85	83
December	29·902	16th	30·358	30 111	28·800	11th	27·652	28·686	1·002	29·538	29·479	52·6	19th	57·8	53·1	19·0	26th	13·2	22·9	33·6	40·3	42·6	31 8	34 0	8·5	8·5	39·4	38·9	36·2	38·6	34·4	36·6	31·7	34·1	·180	·198	2·1	2·3	0·5	0·5	552	548	97	22nd	100	97	52	28th	44	63	84	84
Means, or totals..	30·080		30·376	30·073	29·017		28·354	28·892	1·063	29·512	29·503	63·1		72·8	64·5	30·9		26·0	33·2	32·2	52·2	54·1	41·3	42·5	10·9	11·6	48·2	47·7	45 9	47 4	43·0	44·3	39·7	41·0	·253	·264	2·9	3·0	0·8	0·9	541	539	97		100	95	50		37	56	79	79

Months.	Bright Sunshine.				Temp. of Air in Sun's Rays.			Wind.																										Mean Amount of Cloud.	Rain.													
								Direction: Relative Proportion of at 9 a.m.								Velocity.										Pressure.																							
																At 9 a.m.			During 24 hours.																													
	Greatest Daily Duration.	Date.	Total of Month.	Per cent. of Possible Duration.	Highest.	Date.	Mean.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Mean.	Highest.	Date.	Mean.	Mean of 6 years.	Highest.	Date.	Highest of 6 years.	Total Registered in Month.	Mean of Monthly T°s of 6 yrs	Highest Monthly T°s of 6 yrs	Mean of all Daily Highst.	Mean of all Daily Highst. in 9 Years.	Highest.	Direction.	Date.	Mean of Highest of Month of 9 Years.																	
	hr. min.	On	hr. min.		Deg.	On	Deg.	No.	No.	No.	No.	No.	No.	No.	No.	p'r hr.	p'r hr.	On	per d.	per d	per d.	On	Mil s per d.	Miles.	Miles	Miles	lb. per sq. ft.	lb. per sq. ft.	lb. per sq. ft.		On	lb. per sq. ft.	0—10	No.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Per cent
January	4 50	4th	24 10	10	74·5	25th	55·2	5	1	4	3	1	4	11	2	7·0	21·4	30th	156	158	439	30th	439	4837	4915	6724	2·77	2·88	9·00	W	30th	11·75	7·7	19	0·39	11th	1·95	2·59	2·209	2·474	0·265	11·2										
February	5 15	4th	37 50	14	84 0	12th	64·1	6	4	3	1	1	4	7	3	7·2	17·4	1st	163	159	319	2nd	462	4717	4522	5488	2 30	2·51	8·00	W	2nd	9·44	7·5	19	0·83	15th	2·82	1·79	2·609	2·972	0·363	11·4										
March	6 30	20th	48 0	13	95·2	19th	73·2	12	4	4	1	3	0	4	3	5·9	13·3	17th	143	182	223	18th	559	4435	5029	5803	1·41	2·23	5 00	S S W	18th	9·22	7·2	13	0·31	16th	0·97	2·11	2 776	3·260	0·484	11·7										
April	9 45	11th	111 25	27	103·2	24th	88·3	11	6	1	0	1	3	4	4	5·6	12·9	28th	116	151	247	28th	359	3466	4528	5569	1·91	2·19	10·00	N	28th	7·97	6·8	14	0·31	28th	1·11	2 01	2·516	2·835	0·319	11·2										
May	12 30	12th	109 55	22	105·0	13th	96·0	3	4	1	1	3	5	10	4	6·9	18·0	20th	168	151	267	4th	375	5218	4679	5349	3·31	2·25	8 00	W	17th	7·47	6·5	18	1·17	28th	3·11	1·92	2·103	2·277	0·174	10·8										
June	12 30	7th	141 15	28	106·6	8th	101·2	6	4	3	2	5	4	0	6	5·9	12 0	3rd	127	137	262	27th	262	3800	4086	4764	2·36	1·65	4·00	W	27th	6·03	6·7	20	1·08	28th	3·50	2·28	2·837	3·011	0·174	10·6										
July	12 30	8th	99 50	20	107·5	23rd	94·9	2	10	6	2	1	4	5	1	6·5	23·0	8th	147	139	359	8th	359	4543	4305	4771	2·55	1·78	10·00	N W	9th	6·22	7·5	10	0·40	18th	1·56	2·83	3·401	3·641	0·240	10·7										
August	10 30	4th	110 30	24	107·5	21st	97·5	3	0	1	1	4	12	7	3	7·1	19·2	30th	136	131	291	31st	493	4222	4050	4603	2·70	1·78	7·00	S W	31st	7·53	7·1	16	0·89	30th	2·57	2·68	3·654	3·892	0·238	10·7										
September	9 45	25th	94 3	25	107·0	4th	97·6	5	1	0	0	4	8	10	2	7·6	19·8	27th	162	138	279	2nd	309	4873	4135	4873	2·80	2·00	6·00	S W	2nd	6·17	7·3	18	0·35	30th	1·87	2·58	2·894	3·229	0·335	11·2										
October	6 30	24th	66 30	20	91 0	13th	77·3	5	4	0	1	2	4	10	5	5·7	12 8	28th	104	150	290	10th	390	3223	4633	5127	—	—	—	—	—	—	6·4	21	2 72	15th	6·92	3·59	3·640	4·012	0·372	11·0										
November	3 20	1st	12 0	5	81·0	6th	63·5	0	1	1	5	6	15	2	0	3·9	13·0	26th	91	147	262	30th	490	2719	4402	7853	—	—	—	—	—	—	7·8	14	0·54	5th	1·76	2·86	3 421	3·828	0·407	11·2										
December	4 35	5th	13 25	6	63·0	1st	54·0	4	5	1	1	5	2	6	5	4·0	14·8	18th	99	133	231	19th	354	3066	4122	5115	—	—	—	—	—	—	7·5	11	0·17	9th	0.74	2·58	3·681	4·170	0·489	11·3										
Means, or totals..	8 12		866 53	19	93·8		79 8	62	44	25	22	33	69	75	36	6·1	15·9		134	146	291		404	49139	53406	5503	—	—	—			—	7·2	193	0·76		28·88	29·80	35·741	39·601	3·860	11·08										

80424

OCT 11 1945
LIBRARY

METEOROLOGY OF BRADFORD FOR 1892.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	PRESSURE. Highest. Reading of Barom. during Year.	Highest. Date.	Lowest. Reading of Barom. during Year.	Lowest. Date.	TEMPERATURE. In Shade. Highest. R'ding of Maximum Thermom. during Yr.	Highest. Date.	Lowest. R'ding of Minimum Thermom. during Yr.	Lowest. Date.	Last and First Frost of Seasons. Date of Last Frost.	Date of First Frost.	In Sun's Rays. Highest. Reading of Solar Thermom. during Yr.	Highest. Date.	HUMIDITY. (Complete Saturation = 100.) Highest. Degree of Humidity during Yr.	Highest. Date.	Lowest. Degree of Humidity during Yr.	Lowest. Date.	BRIGHT SUNSHINE. Greatest Daily Duration.	Date.	Total of Year.	Per cent. of Possible Duration.	WIND PRESSURE. Highest.	Date.	RAIN. Total for Year	Mean Yrly Rainfall at Town Hall and Mid. Rly Stn. on surface of g'nd	Grtr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc. Depth in Inches.	Percentage of fall at Exch'ge	Greatest Daily Fall during Yr.	Date.	Snow. Last and First Snow of Seasons. Date of Last Snow.	Date of First Snow.
	Ins.		Ins.		Deg.		Deg.				Deg.		0—100		0—100		hr. min.		hr. min.		lb. per sq. ft.		Ins.	Ins.	Ins.	Per cent	Ins.			
1869	30·290	Dec. 6	28·500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	April 3	Oct. 19
1870	30·284	Jan. 19	28·308	Jan. 8	85·0	July 25	16·6	Dec. 23	Mar. 30	Nov. 9	127·5	July 26	98	Jan. 29	28	Mar. 8	.....	.....	.....	.....	.....	.....	24·120	.....	.....	.....	0·820	June 18	Mar. 24	Nov. 15
1871	30·152	Mar. 28	28·308	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2	.....	.....	.....	.....	.....	.....	21·640	.....	.....	.....	0·985	June 16	Mar. 15	Nov. 16
1872	30·156	April 6	28·070	Jan. 24	86·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23	.....	.....	.....	.....	.....	.....	42·060	.....	.....	.....	2·490	June 19	May 11	Nov. 13
1873	30·338	Feb. 18	28·022	Jan. 20	88·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26	.....	.....	.....	.....	.....	.....	21·440	.....	.....	.....	1·200	Aug. 4	April 25	Jan. 3, '74
1874	30·476	Mar. 6	28·276	Dec. 11	80·9	July 20	15·0	Dec. 31	Mar. 12	Nov. 11	125·8	July 20	100	Feb. 6	42	May 18	.....	.....	.....	.....	.....	.....	23·560	.....	.....	.....	0·740	Dec. 7	May 9	Nov. 26
1875	30·305	July 7	28·484	Nov. 10	80·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6	.....	.....	.....	.....	.....	.....	30·280	.....	.....	.....	1·700	Nov. 15	Mar. 12	Nov. 9
1876	30·300	Jan. 15	28·070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 5	.....	.....	.....	.....	.....	.....	35·270	39·788	4·518	11·28	1·810	Oct. 9	April 12	Nov. 8
1877	30·358	Oct. 6	28·300	Nov. 29	80·0	June 19	20·0	Mar. 1	May 4	Oct. 18	116·4	June 19	100	Oct. 29	35	May 23	.....	.....	.....	.....	.....	.....	40·650	45·499	4·849	11·19	1·420	July 16	May 19	Oct. 15
1878	30·320	Mar. 16	28·630	April 1	89·6	July 19	13·9	Dec. 26	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9	.....	.....	.....	.....	.....	.....	35·434	39·010	3·576	11·01	1·220	Aug. 14	April 1	Nov. 8
1879	30·352	Dec. 13	28·500	Feb. 10	74·4	July 30	13·2	Dec. 7	May 10	Nov. 14	101·2	Aug. 13	100	Oct. 7	61	Dec. 12	.....	.....	.....	.....	.....	.....	26·017	30·298	2·281	10·82	1·020	June 8	May 7	Nov. 20
1880	30·332	Jan. 7	28·154	Nov. 16	81·3	Sep. 5	20·8	Jan. 20	Feb. 23	Oct. 20	112·0	Aug. 13	99	Dec. 15	50	May 30	.....	.....	.....	.....	.....	.....	35·690	39·616	3·926	11·10	1·710	Oct. 27	Mar. 2	Oct. 27
1881	30·382	May 10	28·250	Oct. 14	*53·3	July 6	12·0	Jan. 26	April 21	Oct. 17	116·5	June 1	98	Oct. 14	38	May 31	.....	.....	.....	.....	.....	.....	35·434	39·892	4·458	11·26	1·435	Oct. 13	April 20	Oct. 29
1882	30·544	Jan. 18	28·452	Mar. 1	77·4	Aug. 12	18·6	Dec. 11	April 16	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18	.....	.....	.....	.....	.....	.....	39·683	43·103	3·420	10·86	1·608	Dec. 6	Mar. 21	Nov. 19
1883	30·500	April 9	28·452	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9	.....	.....	.....	.....	.....	.....	34·396	.....	.....	.....	1·338	Sep. 26	Mar. 24	Nov. 10
1884	30·354	Oct. 5	28·376	Jan. 27	84·4	Aug. 12	26·5	Nov. 30	April 24	Nov. 24	107·8	Aug. 9	98	Jan. 23	30	May 22	.....	.....	.....	.....	.....	.....	27·657	.....	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1885	30·273	Mar. 14	28·400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 16	113·6	July 27	100	Jan. 23	32	June 4	.....	.....	.....	.....	.....	.....	25·699	.....	.....	.....	1·208	Sep. 3	May 7	Dec. 9
1886	30·355	Nov. 24	27·652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108·8	July 5	99	Jan. 12	32	May 4	11 45	July 6	851 48	19	18·00	Jan. 24	27·657	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1887	30·412	Feb. 8	28·328	Nov. 3	82·8	July 9	21·1	Jan. 17	April 17	Oct. 12	107·6	July 9	100	April 21	35	July 9	12 40	July 3	1120 58	25	15·25	Dec. 4	25·699	.....	.....	.....	1·208	Sep. 3	May 7	Dec. 9
1888	30·333	Jan. 10	28·410	Mar. 28	80·4	June 27	19·2	Feb. 14	April 8	Oct. 2	110·0	Sep. 15	99	Mar. 15	39	June 11	13 40	May 24	984 20	20	15·00	Dec. 9	35·993	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1889	30·358	Dec. 5	28·460	Mar. 20	77·5	Aug. 1	21·3	Mar. 4	Mar. 22	Nov. 27	116·2	June 23	99	April 22	39	June 26	12 15	July 8	827 45	18	13·00	May 4	26·646	.....	.....	.....	0 810	Oct. 9	May 21	Oct. 14
1890	30·378	Feb. 23	28·315	Jan. 23	76·4	Sept. 10	16·4	Dec. 22	Mar. 10	Oct. 28	111·0	June 16	99	May 11	31	May 29	14 25	May 25	824 5	18⅔	12·00	Feb. 9	22·141	.....	.....	.....	1·050	Nov. 3	April 8	Oct. 1
1891	30·394	Oct. 31	28·060	Nov. 11	79·9	Sept. 12	12·0	Jan. 19	May 18	Nov. 25	107·0	July 27	100	Feb. 20	37	July 17	11 45	May 12	805 35	18	14·0	Jan. 19	25·730	.....	.....	.....	0·590	Mar. 9	Mar. 21	Nov. 25
1892	30·256	Mar. 30	28 638	Feb. 2	77 0	Aug. 24	18·8	Feb. 19	April 19	Oct. 25	107·6	July 23	99	Jan. 12	32	April 3	12 30	June 7	866 53	19	13·50	Aug. 28	27·303	.....	.....	.....	1·485	Jan. 22	April 13	Oct. 21
Means	30·342		28·309		81·7		18·0				115·6		99		39		12 43		883 3	20	14·97		29·799	39·601	3·860	11·08	1·377				

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8.40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

Bright sunshine is recorded in hours and minutes by glass sphere on cards, known as Campbell's recorder, fixed on Professor Stokes' zodiacal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 9 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

Rainfall includes melted snow and hail.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the twenty-three years ending with 1892 is 29·799 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 33·101 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1893.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, M. Inst. C.E. retired., F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, M. Inst. C.E., F.R.Met.Soc., F.G.S.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

MONTHS.	PRESSURE OF ATMOSPHERE IN MONTH.											TEMPERATURE OF AIR IN SHADE DURING MONTH.																								VAPOUR.																							
										Corrected for Capillarity and Temperature.		In Each Month.						Daily Mean.										Adopted Mean Temperature.																											
												Highest.	Date.	Highest during 25 Years.	Mean of Highest of 25 Years.	Lowest.	Date.	Lowest during 25 Years.	Mean of Lowest of 25 Years.	Range.	In Each Month.				Range.		Of Dry Bulb.		Of Air.		Of Evaporation.		Dew Point.		Elastic Force.		In a Cubic Foot of Air.				Mean Weight of a Cubic Foot of Air.	Mean of 25 Years.	Degree of Humidity. (Complete Saturation = 100.)											
	Highest Reading of Barometer.	Date.	Highest during 25 Years.	Mean of Highest of 25 Years.	Lowest Reading of Barometer.	Date.	Lowest during 25 Years.	Mean of Lowest of 25 Years.	Range.	Mean.	Mean of 25 Years.									Of all Highest.	Mean of 25 Years.	Of all Lowest.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean.	Mean of 25 Years.	Mean of Short of Saturation.	Mean of 25 Years.																	
	Ins.	On	Ins.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Deg.	On	Deg.	Deg.	Deg.	On	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Ins.	Ins.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	0—100	On	0—100	0—100	0—100	0—100	On	0—100	0—100	0—100	0—100
January	30·059	4th	30·544	30·171	29·078	28th	28·070	28·717	0·972	29·631	29·594	51·3	31st	57·2	52·8	19 0	5th	6·7	23·0	32·3	40·8	42·8	33·7	34·2	7·1	8·6	38·0	39·1	37·5	38·7	35·8	37·0	33·6	34·7	·192	·203	2·3	2·3	0·4	0·4	552	549	98	9th	100	97	65	31st	34	65	86	86
February	29·994	5th	30·412	30·104	28·300	26th	28·300	28·806	1·694	29·209	29·519	56·5	20th	59 8	53·4	26·9	28th	16·8	26·2	29·6	45·3	44·1	36·2	35·3	9·1	8·8	40·2	39·5	40·2	39·4	38·3	37·7	35·8	35·4	·211	·208	2·4	2·4	0·5	0·4	541	548	97	26th	100	97	55	19th	42	65	85	86
March	30·104	25th	30·476	30·13	29·034	1st	28·175	28·798	1·070	29·640	29·501	62·0	13th	66 0	57·1	27·2	19th	17·4	25·7	34·8	52 5	46·4	38·0	35 3	14·5	11·2	44·5	40·5	44·4	40·1	41·1	37·7	37·3	34·7	·222	·202	2·6	2·3	0·8	0·6	545	547	98	1st	99	96	41	28th	28	55	75	82
April	30·234	8th	30·500	30·069	29·560	29th	28·332	28·694	0·674	29·786	29·492	70·0	25th	74·0	63·7	31·2	12th	25·0	31·1	38·8	59·2	52·5	40·8	39·3	18·4	13·3	47·8	44·6	48·1	44·6	43·8	41·2	39·1	37·3	·238	·225	2·7	2·6	1·1	0·8	544	542	94	11th	100	95	37	25th	30	51	71	77
May	30·130	6th	30·382	30·060	29·192	18th	28·661	29·043	0·938	29·660	29·544	70·2	5th	83·9	70·4	40·4	7th	28·6	35·1	29·8	62·5	58·5	47·3	44·1	15·2	14·4	53·8	49·9	53·5	49·7	48·9	45·4	44·3	41·3	·292	·261	3·3	3·0	1·3	1·1	535	537	89	17th	99	92	40	10th	30	44	71	73
June	30·094	7th	30·300	30·031	28·928	23rd	28·840	29·165	1·166	29·594	29·565	83·8	19th	87·8	77·1	46·2	1st	38·0	41·9	37·6	66·5	65·0	51·8	50·2	14·7	14·9	58·2	55·9	57·8	55·8	52·9	51·3	48·5	46·9	·341	·322	3·8	3·6	1·6	1·4	529	531	93	3rd	100	93	43	16th	32	47	71	72
July	29·922	28th	30·305	29·975	29·180	20th	28·690	29·149	0·742	29·485	29·512	80·5	9th	89·6	79·3	49·6	16th	42·0	46·6	30·9	67·8	67·8	54·5	53·7	13·3	14·1	59·8	59·8	59·5	59·6	54·7	54·1	50·4	49·8	·367	·359	4·1	4·0	1·6	1·7	525	526	96	25th	99	91	47	7th	35	48	72	70
August	30·012	29th	30·232	29·970	29·136	21st	28 670	29·060	0·876	29·574	29·498	85·0	19th	85·2	78·2	46·2	6th	38·6	45·2	38·8	70·6	66·9	56·7	53·2	13·9	13·7	62·9	58·9	62·5	58·6	56·7	54·0	51·7	50·1	·385	·363	4·3	4·1	2·0	1·5	524	526	97	3rd	99	92	46	21st	41	51	69	74
September	29·992	12th	30·232	30·073	28·824	29th	28 452	29·009	1·168	29·418	29·516	71·9	6th	81·3	70·9	40·0	23rd	33·5	40·2	31·9	61·5	62·0	50·0	49·7	11·5	12·3	55·4	54·7	54·9	54·8	50·9	51·4	47·1	48·0	·323	·336	3·7	3·8	1·2	1·1	529	531	91	18th	99	95	49	12th	38	54	75	78
October	30·096	23rd	30·394	30·124	28·708	4th	28·250	28·737	1·388	29·426	29·445	64·1	16th	69 9	63·0	31·2	31st	26·7	32·4	32·9	55·9	53·8	45·1	43·3	10·8	10·5	49·8	48·2	49·8	47·8	46·3	45·4	42·8	42·5	·276	·274	3·1	3·1	0·9	0·7	535	537	94	9th	99	97	58	5th	49	61	77	82
November	30·148	21st	30·376	30 062	28·540	17th	28·080	28·670	1·608	29·587	29·456	55·0	4th	61·5	56·4	29 6	19th	23·0	26·7	25·4	46·5	47·3	37·6	38 4	8·9	8·9	41 9	42·8	41·8	42·5	39·5	40·3	36·6	37·6	·219	·226	2·5	2 6	0·6	0 5	547	544	95	18th	100	96	61	16th	43	63	83	83
December	30·358	30th	30·358	30 120	28·410	13th	27·652	28·675	1·948	29·429	29·477	52·8	14th	57·8	53·1	25·0	2nd	13·2	22·9	27·8	46·5	42·7	37·7	34·2	8·8	8·6	42·6	39·0	42·3	38·7	40 3	36·8	37 9	34 3	·228	·199	2·6	2·3	0·5	0·5	543	548	98	25th	100	97	66	2nd	44	63	85	84
Means, or totals..	30·095		30·376	30·074	28·908		28·346	28·893	1·187	29·537	29·504	66·9		72·8	64·6	34·4		26·0	33·2	32·5	56·3	54·2	44·1	42·6	12 2	11·6	49·6	47·8	49 3	47·5	45·8	44·4	42·1	41·0	·274	·265	3·1	3·0	1·0	0·9	537	539	95		100	95	51		37	56	77	79

MONTHS.	BRIGHT SUNSHINE.				TEMP. OF AIR IN SUN'S RAYS.			WIND.																														RAIN.												
								Direction: Relative Proportion of at 9 a.m.								Velocity.									Pressure.																											
																At 9 a.m.			During 24 hours.																															
	Greatest Daily Duration.	Date.	Total of Month.	Per cent. of Possible Duration.	Highest.	Date.	Mean.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Mean.	Highest.	Date.	Mean.	Mean of 7 years.	Highest.	Date.	Highest of 7 years.	Total Registered in Month.	Mean of Monthly T'ls of 7yrs	Highest Monthly T'ls of 7yrs.	Mean of all Daily Highest.	Mean of all Daily Highst. in 10 Years.	Highest.	Direction.	Date.	Mean of Highest of Month of 10 Years.	Mean Amount of Cloud.	Number of Days it fell.	Greatest Daily Fall.	Date.	Amount Collected.	Mean of 24 Years.	Mean of Seven Years ending with 1892, 65½ft. above surface of ground.	Mean of 7 Yrs. endg. with 1892 at T'n Hall and Mid. Ry. Station on surface of ground.	Gr'ter fall on surface at Town Hall & Mid. Stn. than at 65½ft. above surface at Exch.	
	hr. min.	On	hr. min.		Deg.	On	Deg.	No.	No.	No.	No.	No.	No.	No.	No.	Miles per hr.	Miles per hr.	On	Miles per d.	Miles per d	Miles per d.	On	Miles per d.	Miles.	Miles.	Miles.	lb. per sq. ft.	lb. per sq. ft.	lb. per sq ft		On	lb. per sq. ft.	0—10	No.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Depth in Inches.	Percentage of fall at Exch'ge
January	0 50	16th	2 15	1	67·5	31st	56·3	3	3	3	2	1	6	7	6	5·5	15·6	26th	134	155	263	31st	439	4151	4806	6794	1·25	2·72	4·5	W N W	21st	11·02	7·8	9	0·23	7th	0·56	2·51	2·209	2·474	0·265	11·2
February	3 45	9th	21 45	8	82 0	20th	63·7	2	1	3	3	3	10	3	3	7·6	19·2	10th	174	161	353	10th	462	4862	4570	5488	3·67	2·63	13·0	W	8th	9·80	7·0	21	0 77	10th	3·25	1·85	2·609	2·972	0 363	11·4
March	7 40	13th	43 5	13	101·6	13th	79·2	5	0.	2	1	1	5	12	5	5 8	13·3	17th	134	158	317	2nd	559	4156	4904	5803	2·64	2·27	10 2	W	2nd	9·32	5·7	7	0·37	1st	0·97	2 06	2 776	3·260	0·484	11·7
April	11 25	23rd	150 0	36	104 5	3rd	90·7	2	8	7	3	1	2	5	2	3·7	13·3	30th	96	143	282	30th	359	2876	4292	5569	1·17	2·08	4·0	W S W	30th	7·57	4·2	5	0·26	2nd	0·69	1·96	2·516	2·835	0·319	11·2
May	13 0	10th	132 45	27	109·0	23rd	98·6	2	6	6	1	1	7	5	3	6·2	12·2	1st	115	146	214	8th	376	3572	4521	5349	1·62	2·18	4·3	W	1st	7·15	5·7	11	1·18	18th	2·10	1·92	2·103	2·277	0·174	10·8
June	12 20	19th	123 25	24	109·0	17th	97·2	2	8	4	2	1	4	3	6	4·8	15·0	28th	105	132	282	29th	282	3159	3954	4764	1·34	1·62	4·3	S W	29th	5·85	5·8	11	0·66	27th	1·82	2·24	2·837	3·011	0·174	10·6
July	10 40	6th	123 6	24	105·0	2nd	98·8	5	4	4	3	1	4	7	3	6·0	11·4	17th	127	137	250	18th	359	3924	4251	4771	1·73	1·78	5·6	S	10th	6·16	6·8	17	0·67	12th	3·01	2·84	3·401	3·641	0·240	10·7
August	11 0	22nd	163 10	36	117·8	19th	104·0	2	1	1	1	3	9	11	3	6·2	14·8	21st	138	132	306	22nd	493	4276	4082	4603	2·31	1·83	5 2	S W	22nd	7·29	5·5	16	0·28	10th	1·37	2·63	3·654	3·892	0 238	10·7
September	7 20	22nd	88 5	26	104·8	6th	91·7	3	2	0	0	6	7	8	4	5·9	15·2	19th	132	137	381	29th	381	3965	4111	4873	2·06	2·01	8·0	W S W	14th	6·35	6·2	15	0·51	27th	1·73	2·54	2·894	3·229	0·335	11·2
October	7 45	1st	80 50	28	100·0	1st	79·0	0	1	0	0	0	19	8	3	6·4	14·2	26th	139	148	328	26th	390	4301	4586	5127	2·45	2·27	12·6	W S W	29th	8·83	5·5	16	0·57	5th	1·94	3·52	3·640	4·012	0·372	11·0
November	4 0	1st	22 40	9	77·0	5th	63·0	7	4	3	1	0	7	4	4	7 4	18·8	18th	182	152	430	19th	490	5449	4551	7863	4·06	2 44	13 2	W N W	19th	9·73	7·5	22	0·31	2nd	1·31	2·79	3·421	3·828	0·407	11·2
December	2 10	2nd	6 30	3	66·0	17th	58·0	0	1	1	3	4	8	11	3	3·3	20·6	8th	175	139	370	25th	370	5440	4310	5440	3 67	2 58	9·2	W	14th	9 58	7·4	23	1·04	13th	3·92	2·64	3·681	4·170	0·489	11·3
Means, or totals..	7 40		980 36	22	95·4		81·7	33	39	34	20	22	88	84	45	6·1	15·3		138	145	320		413	50131	52938	5530	2·33	2 20	7·8			8 22	6·3	173	0·57		22·67	29·50	35·741	39 601	3·860	11·08

Museum of Comparative Zoology
OCT 11 1945
LIBRARY
80424

METEOROLOGY OF BRADFORD FOR 1893.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	PRESSURE. Highest. Reading of Baron. during Year.	Highest. Date.	Lowest. Reading of Baron. during Year.	Lowest. Date.	TEMPERATURE. In Shade. Highest. R'ding of Maximum Thermom. during Yr.	Highest. Date.	Lowest. R'ding of Minimum Thermom. during Yr.	Lowest. Date.	Last and First Frost of Seasons. Date of Last Frost.	Date of First Frost.	In Sun's Rays. Highest. Reading of Solar Thermom. during Yr.	Highest. Date.	HUMIDITY. (Complete Saturation = 100.) Highest. Degree of Humidity during Yr.	Highest. Date.	Lowest. Degree of Humidity during Yr.	Lowest. Date.	BRIGHT SUNSHINE. Greatest Daily Duration.	Date.	Total of Year.	Per cent. of Possible Duration.	WIND PRESSURE. Highest.	Date.	RAIN. Total for Year	Mean Y'rly Rain-fall at Town Hall and Mid. Rly. Stn.	Grtr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc. Depth in Inches.	Grtr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc. Percentage of fall at Exch'ge	Greatest Daily Fall during Yr.	Date.	Snow. Last and First Snow of Seasons. Date of Last Snow.	Snow. Last and First Snow of Seasons. Date of First Snow.
	Ins.		Ins.		Deg.		Deg.				Deg.		0—100		0—100		hr. min.		hr. mm.		lb. per sq. ft.		Ins.	Ins.	Ins.	Per cent	Ins.			
1869	30·290	Dec. 6	28·500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	April 3	Oct. 19
1870	30·284	Jan. 19	28·308	Jan. 8	85·0	July 25	16·6	Dec. 23	Mar. 30	Nov. 9	127·5	July 25	98	Jan. 29	28	Mar. 8	.....	.....	.....	.....	.....	.....	24·120	.....	.....	.....	0·820	June 18	Mar. 24	Nov. 15
1871	30·152	Mar. 28	28·308	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2	.....	.....	.....	.....	.....	.....	21·640	.....	.....	.....	0·985	June 16	Mar. 15	Nov. 16
1872	30·156	April 6	28·070	Jan. 24	86·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23	.....	.....	.....	.....	.....	.....	42·060	.....	.....	.....	2·490	June 19	May 11	Nov. 13
1873	30·338	Feb. 18	28·022	Jan. 20	88·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26	.....	.....	.....	.....	.....	.....	21·440	.....	.....	.....	1·200	Aug. 4	April 25	Jan. 3, '74
1874	30·476	Mar. 6	28·276	Dec. 11	80·9	July 20	15·0	Dec. 31	Mar. 12	Nov. 11	125·8	July 20	100	Feb. 6	42	May 18	.....	.....	.....	.....	.....	.....	23·560	.....	.....	.....	0·740	Dec. 7	May 9	Nov. 26
1875	30·305	July 7	28·484	Nov. 10	80·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6	.....	.....	.....	.....	.....	.....	30·280	.....	.....	.....	1·700	Nov. 15	Mar. 12	Nov. 9
1876	30·300	Jan. 15	28·070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 5	.....	.....	.....	.....	.....	.....	35·270	39·788	4·518	11·28	1·810	Oct. 9	April 12	Nov. 8
1877	30·358	Oct. 6	28·300	Nov. 29	80·0	June 19	20·0	Mar. 1	May 4	Oct. 18	116·4	June 19	100	Oct. 29	35	May 23	.....	.....	.....	.....	.....	.....	40·650	45·499	4·849	11·19	1·420	July 16	May 19	Oct. 15
1878	30·320	Mar. 16	28·630	April 1	89·6	July 19	13·9	Dec. 26	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9	.....	.....	.....	.....	.....	.....	35·434	39·010	3·576	11·01	1·220	Aug. 14	April 1	Nov. 8
1879	30·352	Dec. 13	28·500	Feb. 10	74·4	July 30	13·2	Dec. 7	May 10	Nov. 14	101·2	Aug. 13	100	Oct. 7	51	Dec. 12	.....	.....	.....	.....	.....	.....	28·017	30·298	2·281	10·82	1·020	June 8	May 7	Nov. 20
1880	30·332	Jan. 7	28·154	Nov. 16	81·3	Sep. 5	20·8	Jan. 20	Feb. 23	Oct. 20	112·0	Aug. 13	99	Dec. 15	50	May 30	.....	.....	.....	.....	.....	.....	35·690	39·616	3·926	11·10	1·710	Oct. 27	Mar. 2	Oct. 27
1881	30·382	May 10	28·250	Oct. 14	63·3	July 6	12·0	Jan. 26	April 21	Oct. 17	116·5	June 1	98	Oct. 14	38	May 31	.....	.....	.....	.....	.....	.....	35·434	39·892	4·458	11·26	1·435	Oct. 13	April 20	Oct. 29
1882	30·544	Jan. 18	28·452	Mar. 1	77·4	Aug. 12	18·6	Dec. 11	April 16	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18	.....	.....	.....	.....	.....	.....	39·683	43·103	3·420	10·86	1·608	Dec. 6	Mar. 21	Nov. 19
1883	30·500	April 9	28·452	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9	.....	.....	.....	.....	.....	.....	34·396	.....	.....	.....	1·338	Sep. 26	Mar. 24	Nov. 10
1884	30·354	Oct. 5	28·376	Jan. 27	84·4	Aug. 12	26·5	Nov. 30	April 24	Nov. 24	107·8	Aug. 9	98	Jan. 23	30	May 22	.....	.....	.....	.....	.....	.....	27·657	.....	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1885	30·273	Mar. 14	28·400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 16	113·6	July 27	100	Jan. 23	32	June 4	.....	.....	.....	.....	.....	.....	16·25	Dec. 4	25·699	.....	1·208	Sep. 3	May 7	Dec. 9
1886	30·355	Nov. 24	27·652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108·8	July 5	99	Jan. 12	32	May 4	11 45	July 6	851 48	19	18·00	Dec. 9	35·993	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1887	30·412	Feb. 8	28·328	Nov. 3	82·8	July 9	21·1	Jan. 17	April 17	Oct. 12	107·6	July 9	100	April 21	35	July 9	12 40	July 3	1120 58	25	15·00	Feb. 4	18·665	.....	.....	.....	0·810	Oct. 9	May 21	Oct. 14
1888	30·333	Jan. 10	28·410	Mar. 28	80·4	June 27	19·2	Feb. 14	April 8	Oct. 2	110·0	Sep. 15	99	Mar. 15	39	June 11	13 40	May 24	884 20	20	13·00	May 4	25·646	.....	.....	.....	1·050	Nov. 3	April 8	Oct. 1
1889	30·358	Dec. 5	28·460	Mar. 20	77·5	Aug. 1	21·3	Mar. 4	Mar. 22	Nov. 27	116·2	June 23	99	April 22	39	June 26	12 15	July 8	827 45	18	12·00	Feb. 9	22·141	.....	.....	.....	0·590	Mar. 9	Mar. 21	Nov. 25
1890	30·376	Feb. 23	28·315	Jan. 23	76·4	Sept. 10	18·4	Dec. 22	Mar. 10	Oct. 28	111·0	June 16	99	May 11	31	May 29	14 25	May 25	824 5	18½	14·00	Jan. 19	25·730	.....	.....	.....	1·485	Jan. 22	April 13	Oct. 21
1891	30·394	Oct. 31	28·060	Nov. 11	79·9	Sept. 12	12·0	Jan. 19	May 18	Nov. 25	107 0	July 27	100	Feb. 20	37	July 17	11 45	May 12	805 35	18	13·50	Aug. 26	27·303	.....	.....	.....	1·020	Dec. 10	May 17	Nov. 26
1892	30·256	Mar. 30	28·638	Feb. 2	77 0	Aug. 24	18·8	Feb. 19	April 19	Oct. 25	107·5	July 23	99	Jan. 12	32	April 3	12 30	June 7	866 53	19	10·00	April 28	28·881	.....	.....	.....	2·720	Oct. 15	April 28	Oct. 24
1893	30·358	Dec. 30	28·300	Feb. 26	85·0	Aug. 19	19·0	Jan. 5	April 12	Oct. 31	117·8	Aug. 19	98	Mar. 1	37	April 25	13 0	May 10	980 36	22	13 20	Nov. 19	22·667	.....	.....	.....	1·180	May 18	Mar. 17	Nov. 5
Means	30·342		28·309		81 8		18·1				115·7		99		39		12 45		895 15	20	14·80		29·502	39·601	3·860	11·08	1·368			

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8.40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

Bright sunshine is recorded in hours and minutes by glass sphere on cards, known as Campbell's recorder, fixed on Professor Stokes' zodiacal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 9 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

Rainfall includes melted snow and hail.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the twenty-four years ending with 1893 is 25·502 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 32·771 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1894.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, M. Inst. C.E. retired., F.R.A.S., F.R.Met.Soc., F.G.S., and Alfred Eley Preston, M. Inst. C.E., F.R.Met.Soc., F.G.S.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

PRESSURE OF ATMOSPHERE IN MONTH.

Months.	Highest Reading of Barometer.	Date.	Highest during 26 Years.	Mean of Highest of 26 Years.	Lowest Reading of Barometer.	Date.	Lowest during 26 Years.	Mean of Lowest of 26 Years.	Range.	Corrected for Capillarity and Temperature. Mean.	Mean of 26 Years.
	Ins.	On	Ins.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.
January	30·290	3rd	30·544	30·176	28·914	31st	28·070	28·725	1·348	29·381	29·519
February	30·158	19th	30·412	30·106	28·902	12th	28 300	28·810	1·256	29·529	29·579
March	30·184	23rd	30·476	30·134	28·616	13th	28·175	28 792	1·538	29·488	29·500
April	29·934	5th	30·501	30·054	28·962	16th	28 332	28·896	0·972	29·465	29 491
May	30·110	24th	30 382	30·062	29·188	28th	28·661	29·048	0·922	29·541	29·544
June	30·140	30th	30 300	30·035	29·320	2nd	28·840	29 171	0·820	29·583	29·556
July	30·052	1st	30·305	29·978	28 970	12th	28·690	29·142	1·082	29·445	29·509
August	29·980	24th	30 232	29·970	29·006	15th	28 670	29·058	0·974	29·473	29·497
September	30·176	30th	30·232	30·077	29·438	25th	29 452	29·017	0·738	29·784	29·527
October	30·202	1st	30 394	30 127	28·512	25th	28·250	28·729	1·690	29 502	29·447
November	30·194	30th	30·376	30 067	28 630	14th	28·080	28·669	1·564	29·497	29·457
December	30·302	27th	30·358	30 127	28·520	22nd	27·652	28·663	1·782	29·546	29·480
Means, or totals..	30·144		30·376	30·077	28·920		28·346	28·894	1·244	29·520	29·505

TEMPERATURE OF AIR IN SHADE DURING MONTH.

Months.	In Each Month. Highest.	Date.	Highest during 26 Years.	Mean of Highest of 26 Years.	Lowest.	Date.	Lowest during 26 Years.	Mean of Lowest of 26 Years.	Range.	Daily Mean. In Each Month. Of all Highest.	Mean of 26 Years.	Of all Lowest.	Mean of 26 Years.	Range. Mean.	Mean of 26 Years.	Of Dry Bulb. Mean.	Mean of 26 Years.	Adopted Mean Temperature. Of Air. Mean.	Mean of 26 Years.
	Deg.	On	Deg.	Deg.	Deg.	On	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
January	52·0	12th	57·2	52·7	10·2	6th	6·7	22·5	41·8	42·3	42·8	34·9	34 2	8·3	8·6	37·9	39·0	37·9	38·6
February	54·0	8th	59 8	53·4	20·2	20th	16·8	25·9	33·8	45·2	44 2	35·0	35·3	10·2	8·9	39·5	39·5	39·6	39·4
March	62·0	31st	66 0	57·3	31·0	17th	17·4	25·9	31·0	50 4	46·6	37·3	35 4	13·1	11·2	43·3	40·8	43·1	40·2
April	67·2	12th	74·0	63·9	35·1	21st	25·0	31·3	32·1	55 2	52·7	42·0	39 4	13·2	13·3	47·3	44·7	47·2	44·7
May	65·0	26th	83·9	70·1	32·4	21st	28·6	35·0	39·6	54·9	58·3	42·2	41·0	12·7	14·3	47·7	49·8	47·3	49·6
June	77·0	30th	87 8	77·1	40·4	7th	38·0	41·9	36·6	62·3	64·9	50·3	50·1	12·0	14·8	55·7	55·9	55·1	55·8
July	80·8	1st	89·6	79·4	51·0	14th	42·0	46·8	29·8	69·0	67·9	54·7	53·8	14·3	14·1	59·8	59·8	59·8	59·6
August	78·6	1st	85 2	77·8	45·2	21st	38·6	45·2	23·4	63·1	66·8	52·8	53·2	10·3	13·6	57·3	58·8	56·8	58·5
September	65·0	2nd	81·3	70·7	39·2	28th	33·5	40·2	25·8	58·5	61·8	48·0	49·6	10·5	12·2	52·6	54·6	52·3	54·7
October	60·4	13th	69 9	62·9	30·8	23rd	26 7	32·3	29·6	52·5	53·7	43·5	43·3	9·0	10·4	47·9	48·1	47·4	47·8
November	60·2	2nd	61·5	56·5	36·9	30th	23·0	29·0	23·3	51·8	47·5	43·7	38 6	8·1	8·9	47·1	43·0	47·2	42·7
December	54·0	14th	57·8	53·1	28·0	31st	13·2	23·1	26·0	46·5	42·9	38·5	34 4	8·0	8·5	42·7	39·2	42·6	38·9
Means, or totals..	63·9		72·8	64·6	33·4		26·0	33·3	30 5	54·3	54·2	43·5	42·6	10·8	11·6	48·2	47·8	48·0	47·5

VAPOUR.

Months.	Elastic Force. Mean.	Mean of 26 Years.	In a Cubic Foot of Air. Mean.	Mean of 26 Years.	Short of Saturation. Mean of 26 Years.	Mean Weight of a Cubic Foot of Air. Mean of 26 Years.	Degree of Humidity. (Complete Saturation = 100.) Highest.	Date.	Highest during 26 Years.	Mean of Highest of 26 Years.	Lowest.	Date.	Lowest during 26 Years.	Mean of Lowest of 26 Years.	Mean.	Mean of 26 Years.
	Ins.	Ins.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	0 –10	On	0 100	0 –100	0 100	On	0—100	0—100	0 –100	0 –100
January	·188	·202	2·2	2·3	0·5	0·4	547	549	100	8th	100	97	64	28th	34	65	83	86
February	·211	·208	2·4	2·4	0·4	0 4	548	548	97	22nd	100	97	62	13th	42	65	87	86
March	·216	·203	2·5	2·3	0·7	0·6	543	547	95	7th	99	96	42	30th	28	54	78	82
April	·253	·226	2·9	2·6	0·8	0·8	538	542	94	8th	100	85	51	11th	30	51	79	77
May	·248	·260	2·7	3·0	1·0	1·1	540	537	96	26th	99	92	44	25th	30	44	74	73
June	·327	·323	3·7	3·6	1·2	1·4	532	531	99	5th	100	93	46	29th	32	47	75	72
July	·377	·360	4·2	4·0	1·6	1·7	524	526	96	25th	99	92	40	5th	35	48	73	70
August	·350	·363	4·0	4·1	1·2	1·4	528	526	98	17th	99	93	55	5th	41	51	76	74
September	·312	·335	3·5	3·8	0·9	1·0	538	531	94	19th	99	95	59	13th	38	54	80	78
October	·277	·274	3·2	3·1	0·6	0·7	539	537	96	31st	99	97	61	1st	49	61	86	83
November	·260	·227	3·0	2 6	0·7	0 5	539	543	97	17th	100	96	47	5th	43	63	81	83
December	·225	·200	2·6	2·3	0·6	0·6	545	548	93	17th	100	97	64	30th	44	63	83	84
Means, or totals..	·269	·265	3·1	3·0	0·9	0·9	538	539	96		100	95	53		37	56	80	79

BRIGHT SUNSHINE.

Months.	Greatest Daily Duration.	Date.	Total of Month.	Per cent. of Possible Duration.
	hr. min.	On	hr. min.	
January	4 0	24th	16 5	6
February	6 15	20th	36 40	13
March	7 40	25th	88 35	24
April	8 45	22nd	68 25	16
May	10 20	13th	105 35	21
June	12 40	30th	84 50	17
July	12 45	1st	139 5	27
August	7 0	21st	82 45	18
September	9 0	10th	76 13	20
October	5 35	15th	31 35	10
November	4 0	17th	24 55	10
December	3 29	16th	16 45	7
Means, or totals..	7 37		771 28	17

TEMP. OF AIR IN SUN'S RAYS.

Months.	Highest.	Date.	Mean.
	Deg.	On	Deg.
January	65·8	28th	59·5
February	83·0	28th	64·5
March	101·0	26th	81·2
April	103·5	12th	86·2
May	104·4	13th	94·4
June	105·0	28th	93·9
July	105·2	9th	101·5
August	104·6	9th	97·6
September	105·0	2nd	88·1
October	93·2	15th	75·0
November	86·2	3rd	69·3
December	73·0	14th	63·7
Means, or totals..	94·2		81·2

WIND.

Months.	Direction: Relative Proportion of at 9 a.m. N.	NE.	E.	SE.	S.	SW.	W.	NW.	Velocity. At 9 a.m. Mean.	Highest.	Date.	During 24 hours. Mean.	Mean of 8 years.	Highest.	Date.	Highest of 8 years.	Total Registered in Month.	Mean of Monthly Tot'l of 8 yrs.	Highest Monthly Tot'l of 8 yrs.	Pressure. Mean of all Daily Highest.	Mean of all Daily Highest in 11 Years.	Highest.	Direction.	Date.	Mean of Highest of Month of 11 Years.
	No.	No.	No.	No.	No.	No.	No.	No.	Miles p'r hr.	Miles p'r hr.	On	Miles per d.	Miles per d	Miles per d.	On	Miles per d.	Miles.	Miles.	Miles.	lb. per sq. ft.	lb. per sq. ft.	lb. per sq ft		On	lb. per sq. ft.
January	5	0	2	6	3	10	3	2	8·9	28·0	27th	198	160	473	28th	473	6135	4972	6724	2·47	2·69	5·5	W S W	22nd	10·52
February	6	15	3	3	2	10	6	2	8·2	19·6	6th	230	170	593	12th	593	6443	4805	6443	3·70	2·72	17·4	W S W	12th	10·49
March	7	40	3	4	3	5	8	4	6·2	20·6	6th	156	158	379	6th	559	4849	4897	5803	2·40	2·28	7·8	W S W	11th	9·18
April	8	45	9	5	4	7	9	5	5·5	9·6	12th	100	138	171	6th	359	2940	4129	5569	0·50	1·94	1 2	S S W	25th	7·00
May	10	20	7	6	0	2	4	3	7·4	13·3	27th	125	143	242	4th	376	3879	4441	5349	0·97	2·07	3 9	W N W	5th	6·86
June	12	40	5	2	6	2	1	3	5·7	13·3	25th	108	129	201	24th	282	3232	3863	4764	0·67	1·53	1·8	W N W	12th	5·43
July	12	45	1	3	6	1	3	1	6·0	10·2	4th	129	136	265	13th	359	4002	4219	4771	0·57	1·67	0 9	W	4th	5·68
August	7	0	2	1	2	3	6	12	4	7·0	13·3	20th	134	132	308	15th	493	4155	4092	4603	0·59	1·72	1·8	W S W	15th	6·80
September	9	0	10th	78	13	20	10	10	3	0	0	0	3	4	5·8	11·0	18th	104	133	190	7th	381	3131	3988	4873	0·45	1·86	1·8	N E	19th	5·94
October	5	35	15th	31	35	10	9	4	3	1	1	2	5·3	13·6	25th	102	142	368	25th	390	3158	4407	5127	0·81	2 14	10·8	S W	26th	9·01
November	4	0	17th	24	55	10	4	3	7	6	6	1	6·3	14·0	20th	145	151	296	14th	490	4348	4626	7853	0·67	2·28	5·8	S	14th	9·37
December	3	29	16th	16	45	7	7	3	2	1	3	9	6	6·7	39·3	22nd	148	140	465	29th	465	4580	4344	5440	2·84	2·60	18·0	S S W	23rd	10·35
Means, or totals..	49	42	45	33	36	47	76	37	6·6	17·2		140	144	329		435	50902	52683	5610	1·39	2·13	6·4			8 06

RAIN.

Months.	Mean Amount of Cloud.	Number of Days it fell.	Greatest Daily Fall.	Date.	Amount Collected.	Mean of 25 Years.	Mean of Seven Years ending with 1892, 65½ft. above surface of ground.	Mean of 7 Yrs. endg. with 1892 at T'n Hall and Mid. Ry. Station on surface of ground.	Gr'ter fall on surface at Town Hall & Mid. Stn. than at 65½ft. above surface at Exch. Depth in Inches.	Gr'ter fall on surface at Town Hall & Mid. Stn. than at 65½ft. above surface at Exch. Percentage of fall at Exch'ge.
	0—10	No.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Per cent
January	7·8	26	0·37	30th	3·87	2·56	2·209	2·474	0·265	11·2
February	7·1	22	0·83	11th	5·47	1·99	2·609	2·972	0·363	11·4
March	5·6	14	0 83	13th	2·74	2 09	2·776	3·260	0·484	11·7
April	7·1	15	0·56	13th	2·48	1·98	2·516	2·835	0·319	11·2
May	7·0	18	0·26	11th	1·42	1·80	2·103	2·277	0·174	10·8
June	7·1	15	0·79	5th	2·44	2·25	2·837	3·011	0·174	10·6
July	6·9	20	0·84	26th	2·78	2·84	3·401	3·641	0·240	10·7
August	7·4	22	0·50	3rd	2·64	2·63	3·654	3·892	0 238	10·7
September	7·4	10	0·17	5th	0·64	2·47	2·894	3·229	0·335	11·2
October	7·9	17	1·11	27th	4·61	3·58	3·640	4·012	0·372	11·0
November	7·0	18	0·58	14th	1·60	2·74	3·421	3·828	0·407	11·2
December	7·8	17	0·48	22nd	2·13	2·62	3·681	4·170	0·489	11·3
Means, or totals..	7·2	214	0 59		32·78	29·63	35·741	39·601	3·860	11·08

Museum of Comparative Zoology
OCT 11 1945
LIBRARY
80424

METEOROLOGY OF BRADFORD FOR 1894.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	PRESSURE. Highest. Reading of Barom. during Year.	Highest. Date.	Lowest. Reading of Barom. during Year.	Lowest. Date.	TEMPERATURE. In Shade. Highest. R'ding of Maximum Thermom. during Yr.	Highest. Date.	Lowest. R'ding of Minimum Thermom. during Yr.	Lowest. Date.	Last and First Frost of Seasons. Date of Last Frost.	Date of First Frost.	In Sun's Rays. Highest. Reading of Solar Thermom. during Yr.	Highest. Date.	HUMIDITY. (Complete Saturation = 100.) Highest. Degree of Humidity during Yr.	Highest. Date.	Lowest. Degree of Humidity during Yr.	Lowest. Date.	BRIGHT SUNSHINE. Greatest Daily Duration.	Date.	Total of Year.	Per cent. of Possible Duration.	WIND PRESSURE. Highest.	Date.	RAIN. Total for Year	Mean Y'rly Rain fall at Town Hall and Mid. Rly Stn. on surface of g'nd	Grtr. fall on srfce. at T'n. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc. Depth in Inches.	Percentage of fall at Exchge	Greatest Daily Fall during Yr.	Date.	Snow. Last and First Snow of Seasons. Date of Last Snow.	Date of First Snow.
	Ins.		Ins.		Deg.		Deg.				Deg.		0—100		0—100		hr. min.		hr. min.		lb. per sq. ft.		Ins.	Ins.	Ins.	Per cent	Ins.			
1869	30·290	Dec. 6	28·500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	April 3	Oct. 19
1870	30·284	Jan. 19	28·308	Jan. 8	85·0	July 25	16·6	Dec. 23	Mar. 30	Nov. 9	127·5	July 25	98	Jan. 29	28	Mar. 8	.....	.....	.....	.....	.....	.....	24·120	.....	.....	.....	0·820	June 18	Mar. 24	Nov. 15
1871	30·152	Mar. 28	28·308	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2	.....	.....	.....	.....	.....	.....	21·640	.....	.....	.....	0·985	June 16	Mar. 15	Nov. 16
1872	30·156	April 6	28·070	Jan. 24	86·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23	.....	.....	.....	.....	.....	.....	42·060	.....	.....	.....	2·490	June 19	May 11	Nov. 13
1873	30·338	Feb. 18	28·022	Jan. 20	88·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26	.....	.....	.....	.....	.....	.....	21·440	.....	.....	.....	1·200	Aug. 4	April 25	Jan. 3, '74
1874	30·476	Mar. 6	28·276	Dec. 11	80·9	July 20	15·0	Dec. 31	Mar. 12	Nov. 11	125·8	July 20	100	Feb. 6	42	May 18	.....	.....	.....	.....	.....	.....	23·560	.....	.....	.....	0·740	Dec. 7	May 9	Nov. 26
1875	30·305	July 7	28·484	Nov. 10	80·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6	.....	.....	.....	.....	.....	.....	30·280	.....	.....	.....	1·700	Nov. 15	Mar. 12	Nov. 9
1876	30·300	Jan. 15	28·070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 5	.....	.....	.....	.....	.....	.....	35·270	39·788	4·518	11·28	1·810	Oct. 9	April 12	Nov. 8
1877	30·358	Oct. 6	28·300	Nov. 29	80·0	June 19	20·0	Mar. 1	May 4	Oct. 18	116·4	June 19	100	Oct. 29	35	May 23	.....	.....	.....	.....	.....	.....	40·650	45·499	4·849	11·19	1·420	July 16	May 19	Oct. 15
1878	30·320	Mar. 16	28·630	April 1	89·6	July 19	13·9	Dec. 26	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9	.....	.....	.....	.....	.....	.....	35·434	39·010	3·576	11·01	1·220	Aug. 14	April 1	Nov. 8
1879	30·352	Dec. 13	28·500	Feb. 10	74·4	July 30	13·2	Dec. 7	May 10	Nov. 14	101·2	Aug. 13	100	Oct. 7	51	Dec. 12	.....	.....	.....	.....	.....	.....	28·017	30·298	2·281	10·82	1·020	June 8	May 7	Nov. 20
1880	30·332	Jan. 7	28·154	Nov. 16	81·3	Sep. 5	20·8	Jan. 20	Feb. 23	Oct. 20	112·0	Aug. 13	99	Dec. 15	50	May 30	.....	.....	.....	.....	.....	.....	35·690	39·616	3·926	11·10	1·710	Oct. 27	Mar. 2	Oct. 27
1881	30·382	May 10	28·250	Oct. 14	83·3	July 6	12·0	Jan. 26	April 21	Oct. 17	116·5	June 1	98	Oct. 14	38	May 31	.....	.....	.....	.....	.....	.....	35·434	39·892	4·458	11·26	1·435	Oct. 13	April 20	Oct. 29
1882	30 544	Jan. 18	28 452	Mar. 1	77·4	Aug. 12	18·6	Dec. 11	April 16	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18	.....	.....	.....	.....	.....	.....	39·683	43·103	3·420	10·86	1·608	Dec. 6	Mar. 21	Nov. 19
1883	30·500	April 9	28·452	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9	.....	.....	.....	.....	.....	.....	34·396	.....	.....	.....	1·338	Sep. 26	Mar. 24	Nov. 10
1884	30·354	Oct. 5	28·376	Jan. 27	84·4	Aug. 12	26·5	Nov. 30	April 24	Nov. 24	107·8	Aug. 9	98	Jan. 23	30	May 22	.....	.....	.....	.....	.....	.....	27·657	.....	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1885	30 273	Mar. 14	28 400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 16	113·6	July 27	100	Jan. 23	32	June 4	.....	.....	.....	.....	.....	.....	24·00	Jan. 24	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1886	30·355	Nov. 24	27·652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108·8	July 5	99	Jan 12	32	May 4	11 45	July 6	851 48	19	15 25	Dec. 4	25 699	.....	.....	.....	1·208	Sep. 3	May 7	Dec. 9
1887	30·412	Feb. 8	28 338	Nov. 3	82·8	July 9	21·1	Jan. 17	April 17	Oct. 12	107·6	July 9	100	April 21	35	July 9	12 40	July 3	1120 58	25	18 00	Dec. 9	35·993	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1888	30·333	Jan. 10	28 410	Mar. 28	80·4	June 27	19·2	Feb. 14	April 8	Oct. 2	110·0	Sep. 15	99	Mar. 15	39	June 11	13 40	May 24	984 20	20	15·00	Feb. 4	18 665	.....	.....	.....	0 810	Oct. 9	May 21	Oct. 14
1889	30·358	Dec. 5	28·460	Mar. 20	77·5	Aug. 1	21·3	Mar. 4	Mar. 22	Nov. 27	115·2	June 23	99	April 22	39	June 26	12 15	July 8	827 45	18	13·00	Feb. 9	22·141	.....	.....	.....	0·590	Mar. 9	Mar. 21	Nov. 25
1890	30·376	Feb. 23	28 315	Jan. 23	76·4	Sept. 10	18·4	Dec. 22	Mar. 10	Oct. 28	111·0	June 16	99	May 11	31	May 29	14 25	May 25	824 6	18½	14·0	Jan. 19	25 730	.....	.....	.....	1 485	Jan. 22	April 13	Oct. 21
1891	30 394	Oct. 31	28·060	Nov. 11	79·9	Sept 12	12·0	Jan 19	May 18	Nov. 25	107 0	July 27	100	Feb. 20	37	July 17	11 45	May 12	805 35	18	13·50	Aug. 26	27·303	.....	.....	.....	1·020	Dec. 14	May 17	Nov. 26
1892	30·256	Mar. 30	28 638	Feb. 2	77 0	Aug. 24	18·8	Feb. 19	April 19	Oct. 25	107·5	July 23	99	Jan. 12	32	April 3	12 30	June 7	866 53	19	10·00	April 28	28·881	.....	.....	.....	2 720	Oct 15	April 28	Oct. 24
1893	30·358	Dec 30	28·300	Feb. 26	85·0	Aug. 19	19·0	Jan 5	April 12	Oct. 31	117·8	Aug. 19	98	Mar. 1	37	April 25	13 0	May 10	980 36	22	13 20	Nov. 19	22·667	.....	.....	.....	1·180	May 18	Mar. 17	Nov. 5
1894	30 302	Dec. 27	28 512	Oct. 25	80·8	July 1	10·2	Jan. 6	Mar. 17	Oct. 22	105·2	July 9	100	Jan. 8	40	July 5	12 45	July 1	771 28	17	18·00	Dec. 23	32·782	.....	.....	.....	1·114	Oct. 27	Mar. 13	Dec 29
Means	30·341		28·316		81 8		17 8				115·3		99		39		12 45		881 30	20	15·09		29·634	39·601	3·860	11·08	1·358			

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8.40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

Bright sunshine is recorded in hours and minutes by glass sphere on cards, known as Campbell's recorder, fixed on Professor Stokes' zodiacal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 9 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

Rainfall includes melted snow and hail.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the twenty-five years ending with 1894 is 29·634 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 32·917 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory.

Museum of Comparative Zoology
OCT 11 1945
LIBRARY

80424

METEOROLOGY OF BRADFORD FOR 1895.

Computed from daily observations made at the Exchange, Bradford, by John McLandsborough, M. Inst. C.E. retired., F.R.A.S., F.R.Met.Soc., F.G.S., Alfred Eley Preston, M. Inst. C.E., F.R.Met.Soc., F.G.S., and Henry Arthur Johnson, Assoc. M. Inst. C.E.
Latitude, 53deg. 47min. 38sec. N.; longitude, 1deg. 45min. 4sec. W. Height above mean sea level, 366ft.

Months.	Pressure of Atmosphere in Month.											Temperature of Air in Shade during Month.																										Vapour.											
												In Each Month.						Daily Mean.																													
																		In Each Month.				Range.		Of Dry Bulb.		Adopted Mean Temperature.																					
																										Of Air.		Of Evaporation.		Dew Point.		Elastic Force.		In a Cubic Foot of Air.				Mean Weight of a Cubic Foot of Air.	Mean of 27 Years.	Degree of Humidity. (Complete Saturation = 100.)											
	Highest Reading of Barometer.	Date.	Highest during 27 Years.	Mean of Highest of 27 Years.	Lowest Reading of Barometer.	Date.	Lowest during 27 Years.	Mean of Lowest of 27 Years.	Range.	Corrected for Capillarity and Temperature.		Highest.	Date.	Highest during 27 Years.	Mean of Highest of 27 Years.	Lowest.	Date.	Lowest during 27 Years.	Mean of Lowest of 27 Years.	Range.	Of all Highest.	Mean of 27 years.	Of all Lowest.	Mean of 27 years.	Mean.	Mean of 27 Years.	Mean.	Mean of 27 Years.	Mean.	Mean of 27 Years.	Mean.	Mean of 27 Years.	Mean.	Mean of 27 Years.	Mean.	Mean of 27 Years.	Short of Saturation.	Mean of 27 years.		Highest.	Date.	Highest during 27 Years.	Mean of Highest of 27 Years.	Lowest.	Date.	Lowest during 27 Years.	Mean of Lowest of 27 Years.	Mean.	Mean of 27 Years.
										Mean.	Mean of 27 Years.																																						
	Ins.	On	Ins.	Ins.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Deg.	On	Deg.	Deg.	Deg.	On	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Grs.	Grs.	Grs.	Grs.	Grs.	0—100	On	0—100	0—100	0—100	On	0—100	0—100	0—100	0—100
January	30·260	30th	30·544	30·179	28·636	17th	28·070	28·721	1·654	29·[illegible]	29·511	40·4	[illegible]th	57·2	52·3	1·3	12th	6·7	22·3	23·2	36·9	42·5	28·8	34·0	7·1	8·5	32·8	38·8	32·5	38·4	31·1	36·7	28·2	34·4	·154	·200	1·8	2·3	0·4	0·4	552	549	96	16th	100	97	58	28th	34	65	84	86
February	30·154	17th	30·412	30·108	29·302	24th	28·350	28·828	0·852	29·[illegible]	29·5[illegible]	[illegible]·0	24th	59·6	53·0	9·4	6th	9·4	25·3	34·6	34·6	43·8	26·8	34·9	8·9	8·9	30·5	39·2	30·3	39·1	29·1	37·4	26·6	35·0	·138	·205	1·8	2·4	0·4	0·4	562	549	94	24th	100	97	46	22nd	42	64	81	86
March	29·984	16th	30·476	30·123	28·288	28th	28·175	28·774	1·696	29·[illegible]	29·491	[illegible]·4	23rd	66·0	57·2	27·2	3rd	17·4	25·9	28·2	47·0	46·6	37·4	35·4	9·6	11·2	41·7	40·6	41·5	40·3	39·1	37·9	36·1	34·8	·213	·203	2·5	2·4	0·6	0·6	541	547	98	10th	99	96	59	22nd	28	54	82	82
April	30·044	12th	30·500	30·083	28·970	6th	28·332	28·899	1·074	29·[illegible]	29·491	60·4	22nd	74·0	63·7	32·4	3rd	25·0	31·3	28·0	53·0	52·7	40·7	39·4	12·3	13·2	46·4	44·8	45·9	44·7	42·2	41·3	37·9	37·4	·230	·226	2·6	2·6	0·9	0·8	540	542	98	18th	100	95	47	7th	30	51	74	77
May	30·210	4th	30 382	30·069	29·376	21st	28·661	29 060	0·894	29·704	29·549	75·0	31st	83·9	70·3	38·0	5th	28·6	35·1	37·0	61·8	58·5	47·3	44·1	14·8	14·4	53·7	49·9	53·2	49·7	48·2	45·5	43·2	41·3	·279	·261	3·1	3·0	1·4	1·1	536	537	84	18th	99	92	40	6th	30	44	69	73
June	30·158	24th	30 300	30·04[illegible]	29·350	19 h	28·840	29·177	0·838	29·674	29·570	73·2	27th	87·8	77·0	42·0	15th	38·0	41·9	31·2	64·1	64·9	53·1	50·3	11·0	14·6	57 7	55·0	57·2	55·8	52·0	51·3	47·2	47·0	·325	·323	3·7	3·6	1·6	1·4	531	531	91	14th	100	93	44	25th	32	47	63	72
July	29·950	5th	30·305	29·977	29·050	21st	28·690	29·139	0·900	29·438	29·506	69·6	9th	89·6	79 0	51·0	12th	42·0	46·9	18·6	64·0	67·7	54·8	55·8	9·2	13·9	58·5	59·8	58·0	59·5	53·6	54·1	49 6	49·8	·357	·360	4·0	4·0	1·4	1·6	526	526	93	26th	99	92	46	8th	35	48	74	71
August	29·896	16th	30 232	29·967	28·980	4th	28·670	29·055	0·916	29·446	29 496	72·6	19th	85·2	77 6	51·2	25th	38·6	45·6	21·4	64·9	66·7	56·6	53·3	8·3	13·4	60·4	58·9	59·7	58·6	54·9	54·0	50·6	50·1	·370	·363	4·1	4·1	1·6	1·5	524	526	88	27th	99	92	47	18th	41	50	72	74
September	30·092	21 st	30·232	30·078	29·256	11th	28·452	29·026	0·806	29·710	29 53[illegible]	72·6	10th	81·3	70·8	43·8	22nd	33·5	40·3	23·8	64·4	61·9	54·0	49·8	10·4	12·2	58 7	54·8	58·3	54·8	54·9	51·4	51·8	48·1	·386	·337	4·3	3·8	1·1	1·0	530	531	93	25th	99	95	53	4th	38	54	79	78
October	30·236	17th	30·394	30 131	28·720	3rd	28·250	28·728	1·518	29 [illegible]	29 445	62·8	2nd	69 9	62·9	28 8	29th	26·7	32·2	31·0	49·0	53·6	41·4	43·2	7·6	10·4	44·4	48·0	44·3	47·7	42·4	45·3	40·1	42·5	·249	·273	2·8	3·1	0·5	0·7	541	538	97	8th	99	97	58	10th	49	61	85	83
November	30·193	1st	30·376	30 072	28·664	12th	28·060	28·689	1·526	29·472	29·458	60·0	17th	61·5	56·6	36·0	19th	23·0	29·2	24·0	49·1	47·6	42 2	38 7	6·9	8·8	45·6	43·1	45·4	42·8	43·4	40·6	41·1	37·8	·268	·228	2·9	2 6	0·5	0 5	540	543	97	29th	100	97	66	11th	43	63	85	83
December	30·042	27th	30·358	30 124	28 662	15th	27·652	28·663	1·380	29 341	29·475	51·6	6th	57 8	53·1	30·8	28 h	13·2	23·4	20·8	43·1	42·9	37·0	34 5	6·1	8·4	40·5	39·2	40·3	38·9	38·3	36·9	35·7	34 4	·210	·201	2·4	2·3	0·5	0·5	544	548	94	29th	100	97	51	11th	44	63	84	84
Means, or totals	30·104		30·376	30·078	28·935		28·346	28·895	1·169	29·[illegible]	29·504	61·5		72 8	64·5	34·0		25·2	33·3	27 5	52·6	54·1	43 2	42·6	9 4	11·5	47·6	47·8	47·2	47·5	44·1	44·4	40·6	41·0	·264	·265	3·0	3·0	0·9	0·9	539	539	94		100	95	51		37	55	78	79

Months.	Bright Sunshine.				Temp. of Air in Sun's Rays.			Wind.																						Rain.									
								Direction: Relative Proportion of at 9 a.m.								Velocity.								Pressure.					Mean Amount of Cloud.									
																At 9 a.m.			During 24 hours.																			
	Greatest Daily Duration.	Date.	Total of Month.	Per cent. of Possible Duration.	Highest.	Date.	Mean.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Mean.	Highest.	Date.	Mean.	Mean of 9 years.	Highest.	Date.	Highest of 9 years.	Total Registered in Month.	Mean of Monthly Tot's of 9 yrs	Highest Monthly Tot's of 9 yrs.	Mean of all Daily Highst.	Mean of all Daily Highst. in 12 Years.	Highest.	Direction.	Date.	Mean of Highest of Month of 12 Years.		Number of Days it fell.	Greatest Daily Fall.	Date.	Amount Collected.	Mean of 25 Years.	Mean of Eight Years ending with 1892, 65½ft. above surface of ground.	Mean of 8 Yrs. ending with 1892 at T'n Hall and Mid. Ry. Station on surface of ground.	Gr'ter fall on surface at Town Hall & Mid. Stn. than at 65½ft. above surface at Exch.	
																																						Depth in Inches.	Percentage of fall at Exch'ge
	hr. min.	On	hr. min.		Deg.	On	Deg.	No.	No.	No.	No.	No.	No.	No.	No.	Miles p'r hr.	Miles p'r hr.	On	Miles per d.	Miles per d	Miles per d.	On	Mil s per d.	Miles.	Miles	Miles.	lb. per sq. ft.	lb. per sq. ft.	lb. per sq. ft		On	lb. per sq. ft.	0—10	No.	Ins.	On	Ins.	Ins.	Ins.	Ins.	Ins.	Per cent
January	4 40	29th	21 0	8	69·0	23rd	56·9	9	2	6	3	0	1	4	6	5·5	13·0	27th	104	154	225	24th	473	3227	4778	6724	0·60	2·52	5·0	NNW	24th	10 06	7·8	24	0·59	21st	3·45	2·59	2·209	2·474	0·265	11·2
February	6 30	17th	30 27	11	73 0	26th	58·8	9	9	3	3	0	1	2	1	4·0	8·9	1st	92	161	169	27th	593	9579	4557	6443	0 39	2 53	3·7	W	27th	8·93	6·7	5	0·10	1st	0·24	1·93	2·609	2·972	0·363	11·4
March	5 10	27th	39 0	11	95·0	18th	75·2	5	1	2	1	4	3	10	5	6·2	16·6	19th	136	165	396	24th	559	4220	4822	5803	1·33	2·20	6 5	S W	25th	8·96	7·6	19	0 50	10th	2·51	2 10	2·776	3·260	0·484	11·7
April	6 30	17th	56 40	14	101 0	22nd	82·5	6	4	4	1	6	6	1	2	6·2	15·6	10th	130	137	250	11th	359	3891	4103	5569	0 97	1·86	6·3	W S W	7th	6·84	6·8	14	0·68	26th	2·72	2·01	2·516	2·835	0·319	11·2
May	12 10	6th	109 10	22	110·0	27th	95·9	7	5	5	2	2	0	4	6	6·3	13·0	17th	123	141	280	17th	376	3798	4370	5349	0·63	1·95	5·2	N	17th	6·72	4·7	6	0·12	2nd	0 25	1·84	2·103	2·277	0·174	10·8
June	12 30	8th	97 10	19	108·0	9th	100·3	1	4	3	1	2	3	8	8	4·7	9·4	7th	112	127	162	11th	282	3357	3807	4764	0·18	1 42	1·0	N E	8th	5 11	6·4	10	1·60	27th	2·65	2·27	2·837	3·011	0·174	10·6
July	12 15	8th	113 20	22	109·2	31st	101·3	2	0	5	0	5	3	12	4	6·0	13·3	15th	125	135	262	15th	359	3869	4181	4771	1·01	1·61	6·3	W	15th	5 73	6·7	23	1·22	5th	6·37	2·97	3·401	3·641	0·240	10·7
August	10 0	25th	110 50	24	109·5	21st	100·8	2	0	0	0	10	7	10	2	6·6	13·0	28th	138	133	238	31st	493	4264	4111	4603	0·73	1·64	4·4	W	31st	6·60	6·6	19	0·59	12th	2·33	2·62	3·654	3·892	0 238	10·7
September	8 0	10th	115 55	31	109·0	10th	100·1	1	1	1	2	10	4	8	3	5·2	14·8	22nd	101	129	272	12th	381	3623	3881	4873	0·70	1·77	8·8	S W	12th	6·17	5·3	7	0·61	7th	1·20	2·42	2·894	3·229	0·335	11·2
October	8 0	7th	68 30	21	99·3	5th	75·7	8	1	2	2	3	2	3	10	5·9	16·6	7th	121	140	327	12th	390	3748	4334	5127	1·29	2·07	6·6	W S W	12th	8 80	7·2	16	0·65	4th	2·61	3·52	3·640	4·012	0·372	11·0
November	4 30	13th	22 55	9	82·0	10th	60·6	5	5	1	5	6	5	1	2	6·2	16·8	16th	164	152	379	17th	490	4935	4671	7853	1·31	2·20	8·2	S	16th	9 27	8·0	21	0·47	6th	3·33	2·77	3·421	3·928	0·407	11·2
December	5 9	14th	17 25	8	75·0	14th	58 9	0	1	8	3	1	8	8	2	7·0	24·3	5th	166	143	584	5th	584	5141	4432	5440	2·34	2·58	15·2	S W	5th	10·75	8·8	17	0·45	13th	2·63	2·63	3·681	4·170	0·489	11·3
Means, or totals	7 56		802 22	18	95·0		80·6	55	33	40	23	49	43	71	51	5 8	14·9		126	142	295		445	46052	51947	5610	0 96	2·03	6·4			7·92	6·9	181	0·63		30·49	29·67	35·741	39 601	3·860	11·08

80424

OCT 11 1945

LIBRARY

METEOROLOGY OF BRADFORD FOR 1895.

YEARLY MAXIMUM AND MINIMUM ATMOSPHERIC PRESSURE, TEMPERATURE, HUMIDITY, BRIGHT SUNSHINE, WIND PRESSURE, AND RAINFALL.

Year.	PRESSURE. Highest. Reading of Barom. during Year.	Highest. Date.	Lowest. Reading of Barom. during Year.	Lowest. Date.	TEMPERATURE. In Shade. Highest. R'ding of Maximum Thermom. during Yr.	Highest. Date.	Lowest. R'ding of Minimum Thermom. during Yr.	Lowest. Date.	Last and First Frost of Seasons. Date of Last Frost.	Date of First Frost.	In Sun's Rays. Highest. Reading of Solar Thermom. during Yr.	Highest. Date.	HUMIDITY. (Complete Saturation = 100.) Highest. Degree of Humidity during Yr.	Highest. Date.	Lowest. Degree of Humidity during Yr.	Lowest. Date.	BRIGHT SUNSHINE. Greatest Daily Duration.	Date.	Total of Year.	Per cent. of Possible Duration.	WIND PRESSURE. Highest.	Date.	RAIN. Total for Year	Mean Yrly Rainfall at Town Hall and Mid. Rly. Stn.	3 tr. fall on srfce. at Tn. H'll & Mid. Stn. than at 65½ ft. ab've surf. at Exc. Depth in Inches.	Percentage of fall at Exch'ge	Greatest Daily Fall during Yr.	Date.	SNOW. Last and First Snow of Seasons. Date of Last Snow.	Date of First Snow.
	Ins.		Ins.		Deg.		Deg.				Deg.		0—100		0—100		hr. min		hr. min.		lb. per sq. ft.		Ins.	Ins.	Ins.	Per cent	Ins.			
1869	30·290	Dec. 6	28·500	Feb. 1	85·2	Aug. 30	19·8	Dec. 28	Mar. 27	Oct. 20	127·7	Aug. 30	99	Feb. 8	42	Sep. 24	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	...	.....	April 3	Oct. 19
1870	30·284	Jan. 19	28·308	Jan. 8	85·0	July 25	16·6	Dec. 23	Mar. 30	Nov. 9	127·5	July 25	98	Jan. 29	28	Mar. 8	.....	.....	.....	.....	.....	.....	24·120	.....	.....	.....	0·820	June 18	Mar. 24	Nov. 15
1871	30·152	Mar. 28	28·308	Jan. 16	84·0	Aug. 12	6·7	Jan. 1	April 11	Nov. 13	128·7	July 17	98	July 7	43	Nov. 2	.....	.....	.....	.....	.....	.....	21·640	.....	.....	.....	0·985	June 16	Mar. 15	Nov. 16
1872	30·156	April 6	28·070	Jan. 24	86·4	July 23	24·8	Mar. 27	Mar. 27	Nov. 19	124·8	Aug. 19	100	Mar. 22	45	Sep. 23	.....	.....	.....	.....	.....	.....	42·060	.....	.....	.....	2·490	June 19	May 11	Nov. 13
1873	30·338	Feb. 18	28·022	Jan. 20	88·8	July 23	19·2	Feb. 24	Mar. 14	Nov. 5	124·5	July 23	100	Dec. 11	41	Mar. 26	.....	.....	.....	.....	.....	.....	21·440	.....	.....	.....	1·200	Aug. 4	April 25	Jan. 3, '74
1874	30·476	Mar. 6	28·276	Dec. 11	80·9	July 20	15·0	Dec. 31	Mar. 12	Nov. 11	125·8	July 20	100	Feb. 6	42	May 18	.....	.....	.....	.....	.....	.....	23·560	.....	.....	.....	0·740	Dec. 7	May 9	Nov. 26
1875	30·305	July 7	28·484	Nov. 10	80·0	Aug. 17	13·0	Jan. 1	Mar. 22	Nov. 26	122·0	July 5	100	Jan. 23	43	July 6	.....	.....	.....	.....	.....	.....	30·280	.....	.....	.....	1·700	Nov. 15	Mar. 12	Nov. 9
1876	30·300	Jan. 15	28 070	Dec. 4	87·6	July 17	23·0	Jan. 9	April 15	Nov. 9	125·6	July 16	99	Oct. 4	46	May 5	.....	.....	.....	.....	.....	.....	35·270	39·788	4·518	11·28	1·810	Oct. 9	April 12	Nov. 8
1877	30·358	Oct. 6	28·300	Nov. 29	80·0	June 19	20·0	Mar. 1	May 4	Oct. 18	116·4	June 19	100	Oct. 29	35	May 23	.....	.....	.....	.....	.....	.....	40·650	45·499	4·849	11·19	1·420	July 16	May 19	Oct. 15
1878	30·320	Mar. 16	28·630	April 1	89·6	July 19	13·9	Dec. 26	April 6	Nov. 9	118·2	July 22	99	Jan. 13	53	Aug. 9	.....	.....	.....	.....	.....	.....	35·434	39·010	3·576	11·01	1·220	Aug. 14	April 1	Nov. 8
1879	30·352	Dec. 13	28·500	Feb. 10	74·4	July 30	13·2	Dec. 7	May 10	Nov. 14	101·2	Aug. 13	100	Oct. 7	51	Dec. 12	.....	.....	.....	.....	.....	.....	28·017	30·298	2·281	10·82	1·020	June 8	May 7	Nov. 20
1880	30·332	Jan. 7	28·154	Nov. 16	81·3	Sep. 5	20·8	Jan. 20	Feb. 23	Oct. 20	112·0	Aug. 13	99	Dec. 15	50	May 30	.....	.....	.....	.....	.....	.....	35·690	39·616	3·926	11·10	1·710	Oct. 27	Mar. 2	Oct. 27
1881	30·382	May 10	28·260	Oct. 14	83·3	July 6	12·0	Jan. 26	April 21	Oct. 17	116·5	June 1	98	Oct. 14	38	May 31	.....	.....	.....	.....	.....	.....	35·434	39·892	4·458	11·26	1·435	Oct. 13	April 20	Oct. 29
1882	30 544	Jan. 18	28·452	Mar. 1	77·4	Aug. 12	18·6	Dec. 11	April 16	Nov. 12	108·0	Aug. 9	99	Nov. 5	36	May 18	.....	.....	.....	.....	.....	.....	39·683	43·103	3·420	10·86	1·608	Dec. 6	Mar. 21	Nov. 19
1883	30·500	April 9	28·452	Sep. 2	76·2	July 3	19·8	Mar. 10	Mar. 29	Nov. 12	107·6	May 17	99	Dec. 26	30	April 9	.....	.....	.....	.....	.....	.....	34·396	.....	.....	.....	1·338	Sep. 26	Mar. 24	Nov. 10
1884	30·354	Oct. 5	28·376	Jan. 27	84·4	Aug. 12	26·5	Nov. 30	April 24	Nov. 24	107·8	Aug. 9	98	Jan. 23	30	May 22	.....	.....	.....	.....	24·00	Jan. 24	27·657	.....	.....	.....	1·170	Jan. 23	Feb. 28	Nov. 23
1885	30 273	Mar. 14	28·400	Jan. 11	82·2	July 27	22·1	Dec. 11	April 5	Nov. 16	113·6	July 27	100	Jan. 23	32	June 4	.....	.....	.....	.....	15 25	Dec. 4	25 699	.....	.....	.....	1·208	Sep. 3	May 7	Dec. 9
1886	30·355	Nov. 24	27·652	Dec. 8	79·5	July 3	17·4	Mar. 7	April 30	Dec. 2	108·8	July 5	99	Jan. 12	32	May 4	11 45	July 6	851 48	19	18 00	Dec. 9	35·993	.....	.....	.....	2·130	July 26	May 12	Nov. 6
1887	30·412	Feb. 8	28·328	Nov. 3	82·8	July 9	21·1	Jan. 17	April 17	Oct. 12	107·6	July 9	100	April 21	35	July 9	12 40	July 3	1120 58	25	15·00	Feb. 4	18·865	.....	.....	.....	0 810	Oct. 9	May 21	Oct. 14
1888	30·333	Jan. 10	28·410	Mar. 28	80·4	June 27	19 2	Feb. 14	April 8	Oct. 2	110·0	Sep. 15	99	Mar. 15	39	June 11	13 40	May 24	884 20	20	13·00	May 4	25·616	.....	.....	.....	1·050	Nov. 3	April 8	Oct. 1
1889	30·358	Dec. 5	28·460	Mar. 2)	77·5	Aug. 1	21·3	Mar. 4	Mar. 22	Nov. 27	115·2	June 23	99	April 22	39	June 26	12 15	July 8	827 45	18	12·00	Feb. 9	22·141	.....	.....	.....	0 590	Mar. 9	Mar. 21	Nov. 25
1890	30·378	Feb. 23	28·315	Jan. 23	76·4	Sept. 10	18·4	Dec. 22	Mar. 10	Oct. 28	111·0	June 16	99	May 11	31	May 29	14 25	May 25	824 5	18½	14·0	Jan. 19	25 730	.....	.....	.....	1·485	Jan. 22	April 13	Oct. 21
1891	30·394	Oct. 31	28·030	Nov. 11	79·9	Sept. 12	12·0	Jan. 19	May 18	Nov. 25	107 0	July 27	100	Feb. 20	37	July 17	11 45	May 12	805 35	18	13·50	Aug. 26	27·303	.....	.....	.....	1·020	Dec. 10	May 17	Nov. 26
1892	30·256	Mar. 30	28 638	Feb. 2	77·0	Aug. 24	18·8	Feb. 19	April 19	Oct. 25	107·5	July 23	99	Jan. 12	32	April 3	12 30	June 7	866 53	19	10·00	April 28	28·881	.....	.....	.....	2 720	Oct. 15	April 28	Oct. 24
1893	30·358	Dec. 30	28·300	Feb. 26	15 0	Aug. 19	19·0	Jan. 5	April 12	Oct. 31	117·8	Aug. 19	98	Mar. 1	37	April 25	13 0	May 10	980 36	22	13 20	Nov. 19	22·667	.....	.....	.....	1·180	May 18	Mar. 17	Nov. 5
1894	30·302	Dec. 27	28 512	Oct. 25	80·8	July 1	10·2	Jan. 6	Mar. 17	Oct. 22	105·2	July 9	100	Jan. 8	40	July 5	12 45	July 1	771 28	17	18 00	Dec. 23	32·782	.....	.....	.....	1·114	Oct. 27	Mar. 13	Dec. 29
1895	30·270	May 4	28·288	Mar. 28	75 0	May 31	9·4	Feb. 8	Mar. 12	Oct. 28	110 0	May 27	98	April 18	40	May 6	12 30	June 8	802 22	18	15·20	Dec. 5	30 491	.....	.....	.....	1·600	June 27	April 7	Oct. 26
Means	30 338		28·385		81·5		17 5				115·1		99		39		12 44		873 35	20	15·10		29·666	39·601	3·860	11·08	1 367			

EXPLANATION.

The observations are made at nine a.m., and, with the exception of maximum and minimum thermometer readings, again at three p.m.

The highest and lowest barometric readings for each month, also the monthly range, are given as recorded; while the mean pressure is deduced from bi-daily observations corrected for index error, capillarity, temperature, and diurnal range. To correct for altitude or reduce to sea level (the air temperature being 48 degrees and barometer 30 inches at sea level), add ·401 inch to the heights given.

A remarkable instance of barometric depression occurred on the 8th December, 1886, when at 8.40 p.m. the mercury of the Exchange barometer had fallen to 27·456 inches only—the lowest reading on record here. The cyclone indicated by this depression was the cause of great loss of life and property, extending over an unusually large district.

All thermometric observations and deductions are given in degrees Fahrenheit.

The adopted mean temperature of air is deduced from the dry bulb and the maximum and minimum readings; the temperature of evaporation from the dry and wet bulb and the maximum and minimum readings. The dew point, elastic force of vapour, humidity, &c., are deduced from bi-daily readings of the dry and wet bulb hygrometer, by Glaisher's Hygrometrical Tables, sixth edition.

Bright sunshine is recorded in hours and minutes by glass sphere on cards, known as Campbell's recorder, fixed on Professor Stokes' zodiacal frame.

The solar thermometer has a black bulb enclosed in a vacuum.

The direction, velocity, and pressure of wind are recorded as indicated by anemometers fixed 10½ feet above the ridge of roof of Exchange. The velocity per hour at 9 a.m. is determined from anemometer readings made one minute and a half before and a like period after that hour, by multiplying the difference thereof by 20. The pressure is given in pounds avoirdupois per square foot.

The amount of cloud is estimated by a scale ranging from 0 to 10.

Rainfall includes melted snow and hail.

The rain gauge is fixed upon the top of central roof of the Exchange, at an elevation of 65½ feet above the surface of the ground and 395 feet above mean sea level. As rain gauges on the summit of buildings are generally found to collect less rain than when placed upon the surface of open ground adjacent thereto, steps were taken in 1875 to determine to what extent this was the case with the Exchange rain gauge, when two additional gauges were provided and fixed upon the surface of adjacent open spaces, one near to the Town Hall, the other near to the Midland Railway Station, between which the Exchange gauge is situate about midway, and the surface of ground about the same height. At both of these gauges, as well as at the Exchange gauge, daily observations were made from the commencement of 1876 to the end of 1882, a period of seven years, when the surface gauges were removed in consequence of the ground they occupied being no longer available for the purpose. The particulars of these gaugings are set forth in tables. The results show that the mean yearly rainfall on the surface of ground for the seven years ending with 1882 is 3·86 inches, or 11·08 per cent., greater than at the summit of the Exchange. The mean yearly rainfall recorded at the Exchange for the twenty-six years ending with 1895 is 29·666 inches. By adding 11·08 per cent. thereto the mean normal rainfall of central Bradford for such period is found to be 32 953 inches per annum. There are good grounds for concluding that the smaller amount of rainfall collected on the Exchange—and on buildings generally—than on the surface of ground is due to the varying direction and force of wind there producing different currents and eddies, which prevent due precipitation on the top or ridge of roof where the gauge is fixed. The rainfall of 1869 was collected by a gauge placed on the ridge of outer roof of Exchange, near to the north-west corner thereof. This position not being deemed quite satisfactory, the gauge was removed at the end of that year to the ridge of central roof—the place it has since occupied. To avoid risk of inaccurate results, the rainfall of 1869 is omitted from these returns.

The instruments with which the observations are made have been verified by comparison with the standards at Kew Observatory, excepting those which can be verified by measurement.

Yorkshire Naturalists' Union.

President :

CHARLES P. HOBKIRK, F.L.S., Dewsbury.

Hon. Secretaries :

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
Rev. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.
EDGAR R. WAITE, F.L.S., Philosophical Hall, Leeds.

THE NINETY-SIXTH MEETING

WILL BE HELD AT

SETTLE,

FOR

HORTON-IN-RIBBLESDALE,

RIBBLEHEAD, LING GILL, and PENY-GHENT,

On SATURDAY, MAY 14th, 1892.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways, which have booking arrangements for Ribblehead, Horton-in-Ribblesdale, or Settle, to Members and Associates of the Y.N.U. producing their signed card of membership. Members have liberty to break the return journey at Settle.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination ; the reduction of fare will be granted for both portions of the journey.

ROUTES.—

I.—The Geological party, under the leadership of Mr. J. G. Goodchild, F.G.S., of the Geological Survey, will leave Horton-in-Ribblesdale station about 8.30 a-m. The party will call at Ribblehead station at 12.14 noon for such members as may not be able to arrive earlier, and the combined party will then examine the evidences of glacial action, returning to Settle by the train which leaves Horton at 5.10 p.m. See under "Geology" for Mr. Goodchild's outline of this route. This party will include Prof. L. C. Miall and other members of the Yorkshire Boulder Committee.

II.—A party of Naturalists will examine Ling Gill and its neighbourhood under the guidance of Settle friends.

III.—Mr. John Foster will meet the trains arriving at Horton at 7.54 and 12.14 a.m., in order to advise or guide such members as are desirous of investigating Penyghent and its slopes.

The Hon. Secretaries are much indebted to the Misses R. F. and F. P. Thompson, Mr. and Mrs. Ellwood Brockbank, Rev. G. H. Brown, Messrs. F. E. Atkinson, T. Brayshaw, C. W. Buck, E. A. Peak, and Dr. W. Marshall Watts, all of Settle, and to Mr. John Foster, of Horton, for assistance in making the arrangements, and it is expected that several of them will take part in the leadership of the various parties.

Permission for the investigation of their estates has been kindly granted by Messrs. John Foster, James Farrer, J. Hammond, Ald. T. Benson P. Ford, John Slinger, and the Rev. Arthur Ingilby.

All members will return to Settle by the 5.10 p.m. train from Horton.

BOOKS AND MAPS.—The whole of the district for the day's investigation is comprised within Sheet 50 (97 S.W.) one-inch ordnance map (which may be had geologically coloured). The Geology is described by Dakyns, Tiddeman, in the Survey Memoir, etc., and in Tiddeman's paper, Q.J.G.S., 1872, p. 471 (the Ice-sheet in N. Lancs. and adjacent parts). Dr. Marshall Watts' School Flora gives notes on some of the plants, and Mr. E. Peake's privately printed Giggleswick Bird Calendar on the birds. Reference may also be made to Windsor's Flora Cravoniensis, Banks' Walks in Yorkshire (Hull Pot and Hunt Pot, p. 76), Dobson's Rambles by Ribble (Douk Ghyll Scar, p. 57), Hutton's Tour to the Caves, 1781, p. 43, Miall's Geol. and Nat. Hist. of Craven, G. H. Brown's On Foot Round Settle, Davis and Lees' West Yorkshire, as well as to Phillips' classical Works.

EXPLANATION OF MAP.—The following formations are shown: 8 Permian; 7 Coal Measures; 6 Millstone Grit; 5 Yoredale Beds, &c. (with Pendleside Limestone), 4 Carboniferous Limestone; 3 Basement Carboniferous, and Upper Old Red; 2 Silurian, 1 Ordovician.

PHYSICAL GEOGRAPHY AND GEOLOGY.—Mr. J. G. Goodchild, F.G.S., writes: The early contingent will leave Horton about 8-30 a.m., with the object of making a cursory examination of the leading features of geological interest on the west side of the Horton valley. Should time permit, this part of the excursion may embrace a visit to Combs Quarry, where the mountain limestone is seen lying on the upturned ends of the Coniston Flags.

In order to meet the party arriving at Ribblehead by the train due at 12-14, a move towards the north will have to be made early in the forenoon, and it is proposed that this shall be, as far as possible, over the limestone scars of Moughton.

On the arrival of the second contingent at Ribblehead, the glacial phenomena of the neighbourhood will be examined and discussed in some detail, and then a move will be made towards the south, taking the east side of the valley on the return journey. It will be necessary to arrive at Horton Station in time to catch the 5-10 p.m. train to Settle, but, if time permit, attention will be directed to some of the many features of geological interest connected with the older Palæozoic rocks in the neighbourhood of the town itself.

Papyrographed copies of some of the more important sections in the neighbourhood will be distributed amongst the geologists, and it is believed with these, the map, and the demonstrations on the ground, the party may gain as much insight into the geological structure of the district as will be possible in the course of so brief a visit.

Mr. R. H. Tiddeman, M.A., F.G.S., writes :—The most important features of the drift in Upper Ribblesdale are the very well-marked series of mounds or drumlins lying between the crests of Ingleborough and Penyghent. They are best seen about Ribblehead, looking north-east from the Scars above the station, in the direction of Gearstones Inn. The arrangement of the long axes of these mounds shows the direction in which the ice travelled from Newby Head and Cam Fell. The stream spreads out into Ribblesdale in a fan shape, hugging on one side the west side of Penyghent and on the other impinging against the east side of Ingleborough. Some of the drumlins travel across the head of Ribblesdale at the station and are cut through by the railway, showing glaciated Limestone in the cutting. This is an excellent spot for taking a photograph of the general view, if it can be done in the forenoon with good relief of light and shade. Some of the mounds in the neighbourhood of Heln Pot and Fell Close hug the side of Simon Fell, closely curving round with it ; and the scratches on the rocks beneath (if found) will be seen to be taking a corresponding course.

BOTANY.—From information supplied by Mrs. Ellwood Brockbank, Miss Rachel F. Thompson, and Mr. Wm. Whitwell, it appears that the district is exceptionally rich botanically, but the time of year is rather unfavourable, as typical limestone plants are much later in flowering. Ling Ghyll furnishes in proper season *Daphne mezereum*, *Saxifraga umbrosa*, *Vicia sylvatica*, *Epilobium angustifolium*, *Polypodium dryopteris* and *P. phegopteris*. Eight years ago *Galium mollugo* grew at Horton Station, and *Saxifraga aizoides* near Douk Ghyll Scar. On Penyghent occur *Saxifraga oppositifolia*, *Rubus chamæmorus*, *Draba incana*, *Hieracium anglicum*, and *Allosorus crispus*. Other rare plants mentioned as occurring in the Horton district are—*Chelidonium majus*, *Meconopsis cambrica*, *Orchis pyramidalis* and *O. morio*, *Gymnadenia conopsea*, *Ophrys muscifera*, *Galanthus nivalis*, *Convallaria majalis*, *Polygonatum multiflorum* and *P. officinale*, *Hippocrepis comosa*, *Rosa mollis*, *Polemonium cæruleum*, *Antennaria dioica*, and *Cnicus heterophyllus*. The more noteworthy Ferns are—*Osmunda regalis*, *Polystichum lonchitis*, *P. aculeatum*, and *P. angulare*, *Cystopteris fragilis*, *Lastræa spinosa* and *L. rigida*, *Asplenium trichomanes*, *A. viride* and *A. Adiantum-nigrum*, *Polypodium calcareum* and *Botrychium lunaria*.

It is particularly requested, both by the Union and the landowners who so generously facilitate its work, that every effort be made for the protection of the ferns and rare plants.

CRYPTOGAMS, etc.—Mr. Wm. West, F.L.S., writes :—The district is a very fine one for cellular Cryptogams. Among the Muscineæ, such as the following occur :—*Sphagnum papillosum*, *S. recurvum*, *Andreæa petrophila*, *A. crassinervia*, *A. falcata*, *Rhabdoweissia fugax*, *Dicranum majus*, *Ditrichum flexicaule* (also its var. *densum*), *Barbula intermedia*, *Distichium capillaceum*, *Ulota bruchii*, *Orthotrichum cupulatrum*, *Splachnum sphæricum*, *Mnium undulatum* (in fruit), *Polytrichum strictum*, *Fissidens osmundoides*, *Cinclidotus fontinaloides*, *Antitrichia*

curtipendula, *Neckera crispa* (in fruit), *N. complanata*, *Cylindrothecium concinnum*, *Hypnum falcatum*, *Chiloscyphus polyanthus*, *Reboulia hemisphærica*, *Jungermannia cordifolia*, *Plagiochila asplenioides* (in fruit), *Metzgeria pubescens*. Lichens are very numerous, such as *Solorina saccata*, *Physcia cæsia Evernia furfuracea*, *Cladonia cornucopioides*, *Endocarpon rufescens*, *E. miniatum*, *Amphiloma lanuginosum*, *Lecanora sympagia*, *L. parella*, *L. cupularia*, being frequent. A fair list of Algæ will be found in 'The Naturalist,' about a year ago, entitled 'Additions to the Freshwater Algæ of W. Yorks.'

Mr. Soppitt states that *Gymnosporangium juniperi*, *Melampsora cerastii*, and *Uromyces geranii* should be found.

ENTOMOLOGY, etc.—Crayfish are to be found in Ling Ghyll, and are supposed to have been imported from Semer Water. Otherwise nothing appears to be on record as to insects and other articulates.

CONCHOLOGY.—This portion of the Ribble basin has apparently never been systematically investigated but ought to yield a good number of terrestrial molluscs on the limestone scars which fringe the surrounding hills. The species already on record as having been collected by Messrs. Taylor, Nelson, and Roebuck, include—*Zonites radiatulus*, *Z. cellarius*, *Z. nitidulus*, *Helix arbustorum*, *H. rupestris*, *Balea*, *Clausilia rugosa*, *Cl. dubia*, &c.; while of slugs have been found *Limax lævis*, *L. agrestis*, *Arion minimus*, *A. circumscriptus*, *A. subfuscus*, and *A. ater*, the latter being on record for the highest summit of Penyghent. *Ancylus fluviatilis*, which is abundant in the becks, is the only water shell as yet recorded.

VERTEBRATE ZOOLOGY.—Mr. E. Peake informs us that grain-eating birds seem to have decreased in numbers within the memory of man The Goldfinch used to occur but is not found now. The Bullfinch, Redpoll, and Twite still occur, and a colony of the latter birds exists near Horton, where also the Sedge Warbler (the local 'Nightingale') is common. At the date of the excursion many migrants will have returned, and will include Spotted Flycatcher, Ring Ouzel, Cuckoo, Yellow Wagtail, Wheatear, Landrail, Sandpiper, &c. On Penyghent, the Peregrine, Merlin and Raven are still to be seen, and fortunately are strictly preserved by Mr. John Foster, who has some interesting local birds in his house, including Honey Buzzard, Sclavonian Grebe, Great Grey Shrike, &c. On the Moors, the Golden Plover, Curlew, Red Grouse, and Snipe are certain to be seen. The more rocky parts will supply the Kestrel and Stockdove; while the watercourses will yield Dipper, Mallard, Waterhen, Coot, and Little Grebe.

Mr. John Foster states that the Badger has been killed lately, but the Polecat, which was formerly to be found in the district, does not now occur. The Otter and Fox are common, as are also the Hedgehog, Mole, Weazel, and Stoat. Many of the smaller Mammals and Bats no doubt are to be met with, but they have hitherto not received attention. Trout, Minnows, and Bullheads are to be found in the streams.

MICRO-ZOOLOGY AND MICRO-BOTANY.—There appears to be no information under this heading.

Amateur Photographers will be able to change their plates by the kindness of Mrs. John Foster, Horton, who will place her DARK ROOM at the service of the Union.

PROGRAMME OF MEETINGS.—

5-10 p.m.—Train leaves Horton for Settle.
5-30 p.m.—Meat Tea, 2/- each
6-15 p.m.—Sectional Meetings
6-45 p.m.—General Meeting

All at the Ashfield Hotel, Settle.

Yorkshire Naturalists' Union.

President:

CHARLES P. HOBKIRK, F.L.S., Dewsbury.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.
EDGAR R. WAITE, F.L.S., Philosophical Hall, Leeds.

THE NINETY-SEVENTH MEETING

WILL BE HELD AT

DARLINGTON,

FOR

ROKEBY and the GRETA,

THORSGILL, EGGLESTON ABBEY, etc.,

ON

WHIT-MONDAY, 6th June, 1892.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways, which have booking arrangements for Barnard Castle, with liberty to break the return journey at Darlington, to Members and Associates of the Y.N.U. producing their signed card of membership.

Members wishing to spend the week-end in the district may book on Friday or Saturday with liberty to return on Monday night.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

ROUTES.—The main parties will leave Barnard Castle Rly. Station at 11 a.m.

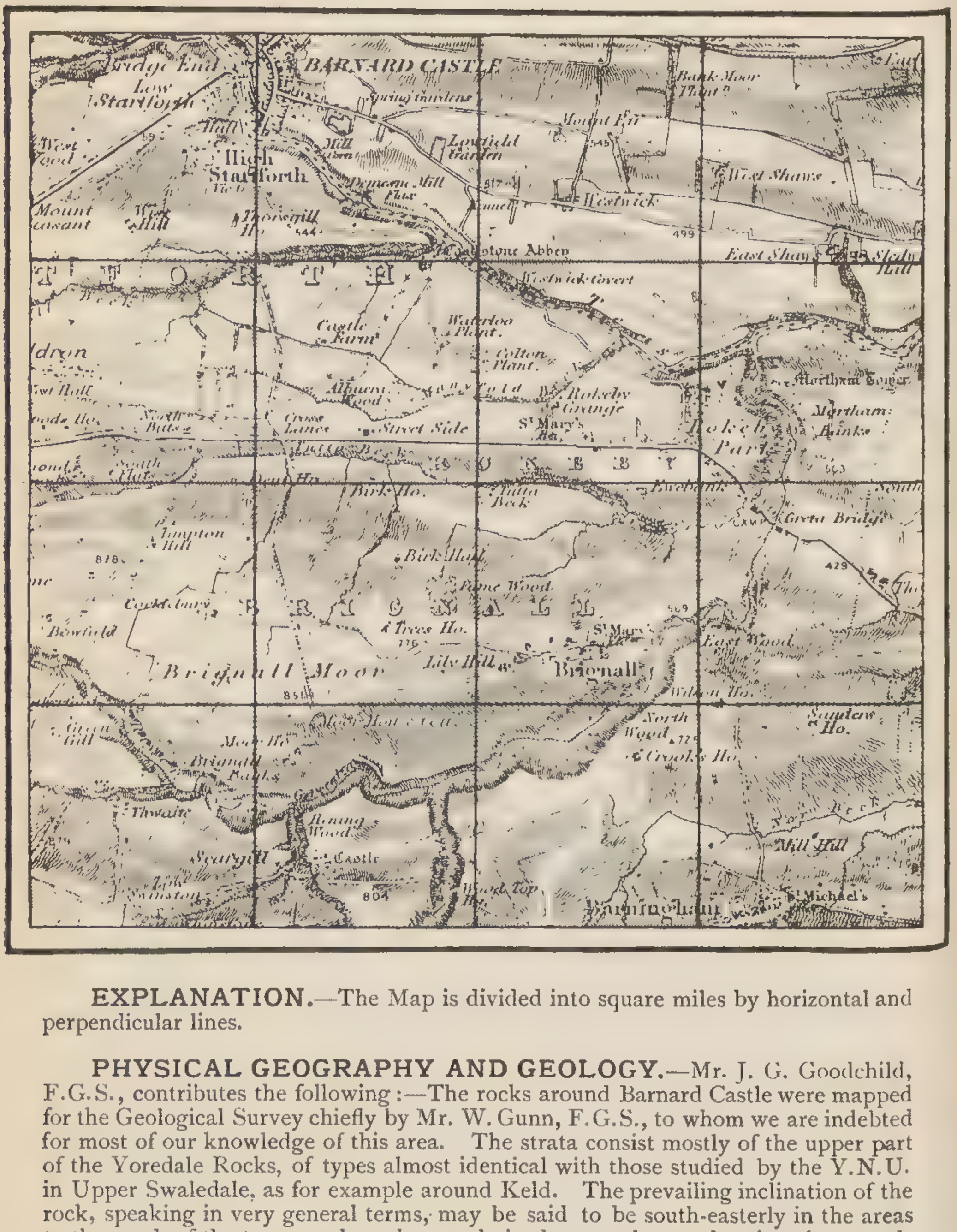
I.—The geologists will be under the leadership of Dr. W. Y. Veitch, of Middlesbrough, and Mr. W. F. Kealing Stock, F.C.S., of Darlington.

II.—The general body of naturalists, under the guidance of Messrs. J. G. Brass and George Best, and other members of the Darlington Society, will proceed to Greta Bridge and devote themselves to investigating Rokeby Park and as much of the valley of the Greta as may be possible.

All will return to Barnard Castle in time for the 3-35 p.m. train for Darlington. Conveyances will be available for all who order accommodation, starting from Greta Bridge at 2-45 p.m. Fare 1/-. The Secretaries are not responsible for finding conveyance accommodation except to written order, reaching Mr. Waite by Saturday morning's post.

Permission for the investigation of their estates has been kindly granted by Lord Strathmore, of Streatlam Castle, Mrs. Morritt, and Mr. G. Gilpin Brown.

BOOKS AND MAPS.—The whole of the district for the day's investigation is comprised within Sheet 32 (103 S.W.) one-inch ordnance map (which may be had coloured for both solid and superficial geology). The following local Guide Books contain information on the Natural History of the district:—'Darlington Saturday Half-Holiday Guide,' by J. Sang and others (1/-); 'Pleasant Memories of Darlington and Neighbourhood,' by John Bousfield; 'Zic-zac Rambles,' by R. Taylor Manson, M.R.C.S.; and both editions of Baker's 'North Yorkshire.' The features of the district are portrayed with characteristic fidelity in Scott's 'Rokeby.'



EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

PHYSICAL GEOGRAPHY AND GEOLOGY.—Mr. J. G. Goodchild, F.G.S., contributes the following:—The rocks around Barnard Castle were mapped for the Geological Survey chiefly by Mr. W. Gunn, F.G.S., to whom we are indebted for most of our knowledge of this area. The strata consist mostly of the upper part of the Yoredale Rocks, of types almost identical with those studied by the Y.N.U. in Upper Swaledale, as for example around Keld. The prevailing inclination of the rock, speaking in very general terms, may be said to be south-easterly in the areas to the north of the town, and north-easterly in those to the south; in other words the larger stucture may be said to be that of an east and west synclinal with its axis declining eastward. Along the axis of the synclinal, chiefly on the Durham side, there occur the remains of the lower members of the Upper Carboniferous rocks, identical in age and also in lithological character, with the rocks that form the summits of Wilbert Fell, Shunner Fell, Water Crag, etc. In the immediate neighbourhood of Barnard Castle there are several exposures of the remarkable siliceous strata that characterize the upper half of the Yoredale Rocks. These have long been known to contain the siliceous remains of ancient sponges and other such organisms in abundance. Some of the finest scenery to the north-west and west of Barnard Castle is shaped out of the Main or Twelve Fadom Limestone, which was so conspicuous a

feature in the scenery of Upper Swaledale, and which, again, form the light grey scars circling the higher part of Penyghent, as well as of Ingleborough.

In many respects the chief feature of geological interest around Barnard Castle is the stream of boulders that has been forced in the Ice sheet over the summit of Stainmoor, and which extends hence south-eastward to the Vale of York and beyond, where the same stream is joined by another, also including boulders of Shap Granite, which has traveiled from the north side of the Lake District (Edenside) by way of Tynedale, and then southward. This last direction has been followed under the influence of the Scandinavian ice.

Writing on the Geology of the Greta Valley Dr. W. Y. Veitch says:—The scars at Rokeby Park are Main Limestone of the Yoredale series of Phillips; the same bed is exposed at the junction of the Greta with the Tees, where it is 380 feet high; it also occurs at the Abbey Bridge, Eggleston, where it is seen dipping northwards. In the Valley of the Greta the upper half of the series only is visible; further up the Greta at Brignall and Scarsgill there are flagstone quarries of the Middle Limestone beds. It is in Teesdale that the Yoredale rocks reach their highest point in Great Britain.

The watercourses about Rokeby are remarkable for their precipitous character, the streams being

'Condemn'd to mine a channell'd way
O'er solid sheets of marble grey.'

Thorsgill's bank being arenaceous and gently sloping, is an exception to the prevailing feature. The district is justly celebrated for varied scenery and wealth of woodland; whilst nearing Bowes the finest moorland in England is approached, extending over 'Stainmoor wild.'

The fossils likely to be noticed in the rocks are:—*Orthoceras*, *Producta*, *Spirifera*, *Terebratula*, Crinoids, and Corals.

BOTANY.—Mr. J. G. Brass writes:—In Brignal woods, or further up the valley of the Tees, the following plants are found:—*Caltha palustris* var. *minor*, *Trollius europæus*, *Helleborus fœtidus*, *Chelidonium majus*, *Helianthemum canum*, *Drosera rotundifolia*, *Malva moschata*, *Euonymus europæus*, *Vicia sylvatica*, *Paris quadrifolia*, *Geranium lucidum*, *Adoxa moschatellina*, *Lathræa squamaria*, *Gagea lutea*, *Potentilla fruticosa*, *Dryas octopetala*, *Agrimonia eupatoria*, *Primula farinosa*, *Gentiana verna*, *Rosa spinosissima*, *Circæa lutetiana*, *Ribes petræum*, *Saxifraga granulata*, *Parnassia palustris*, *Sanicula europæa*, *Conium maculatum*, *Tanacetum vulgare*, *Pyrola minor*, *Menyanthes trifoliata*, *Antirrhinum majus*, *Linaria cymbalaria*, *Mimulus luteus*, *Pinguicula vulgaris*, *Iris pseudacorus*, *Listera ovata*, etc.

The 'Darlington Saturday Half-Holiday Guide' gives a useful account of the botany of the district. It appears that *Campanula glomerata*, *Cardamine amara*, and *Bryonia dioica* occur on the banks of the Tees, *Paris quadrifolia* and *Ranunculus parviflorus* have been found in the Greta Valley, and *Draba incana* at Bowes. Of Ferns, *Scolopendrium vulgare* and *Ophioglossum vulgatum* are recorded.

Dr. W. Y. Veitch mentions the following species as occurring in the Rokeby district and in the Greta Valley:—*Ranunculus lingua*, *Galium boreale*, *Stellaria nemorum*, *Astragalus glycyphyllus*, *Rubus saxatilis*, *Epilobium angustifolium*, *Sonchus asper*, *Campanula latifolia*, *Gentiana verna*, *Lathræa squamaria*, *Lamium galeobdolon*, *Plantago maritima*, *Polygonum viviparum*, and *Habenaria albida*.

ENTOMOLOGY.—Lepidoptera.—Mr. J. G. Brass, of Barnard Castle, writes that the following species may be expected, either as larvæ or imagines:—*Lycæna alsus*, *Bombyx callunæ*, *Saturnia carpini*, *Notodonta camelina*, *N. dictæoides*, *N. ziczac*, *Apamea gemina*, *A. unanimis*, *Epunda viminalis*, *Agriopis aprilina*, *Hadena adusta*, *Plusia iota*, *P. v-aureum*, *P. interrogationis*, *Selenia lunaria*, *Strenia clathrata*, *Numeria pulveraria*, *Fidonia piniaria*, *Hybernia rupicapraria*, *H. leucophæaria*, *H. aurantiaria*, *Anisopteryx æscularia*, *Cheimatobia boreata*, *Larentia cæsiata*, *Emmelesia affinitata*, *E. alchemillata*, *E. albulata*, *E. decolorata*, *Eupithecia lariciata*, *E. exiguata*, *Lobophora hexapterata*, *Thera variata*, *Hypsipetes ruberata*, *Melanthia hastata*, *Cidaria reticulata*, *C. silaceata*, *C. prunata*, and many others.

Neuroptera and Trichoptera.—Mr. G. T. Porritt, F.L.S., F.E.S., says that careful search ought to be made, by beating trees, bushes, etc., for the very rare moth-like *Drepanopteryx phalænoides*, which has more than once been taken in the locality. He adds that the district ought to be specially good for Neuroptera and Trichoptera, and if members meeting with insects in these orders will kindly secure them, and, when not known, forward to him for identification, he will be greatly obliged.

CONCHOLOGY.—Mr. J. G. Brass and Mr. Baker Hudson have supplied notes of mollusca about Rokeby, including such interesting species as *Helix fusca*, *H. ericetorum*, *H. rupestris*, *H. pygmæa*, *H. pulchella*, *Pupa marginata*, *Clausilia laminata*, etc., which have all been noted by Mr. Brass. Of water shells he has taken *Sphærium corneum*, *Limnæa peregra*, *Ancylus fluviatilis*, and *Planorbis spirorbis*. Of slugs, *Limax arborum* occurs abundantly (Hudson), and Mr. Brass records *Limax flavus* and *Amalia sowerbyi*, the latter being a species whose occurrence here being remarkable merits confirmation. Mr. Hudson has taken *Zonites purus*, *Azeca* (Eggleston Abbey), *Clausilia dubia* not nearer than Winston, *Vertigo edentula* in Greta valley, and another *Vertigo*, which he believes to be *substriata*. The other species on record are *Arion ater*, *A. circumscriptus*, *Limax maximus*, *L. agrestis*, *Vitrina*, *Zonites cellarius*, *Z. alliarius*, *Z. nitidulus*, *Z. fulvus*, *Z. crystallinus*, *Helix aspersa*, *H. nemoralis*, *H. hortensis*, *H. caperata*, *H. rufescens*, *H. hispida*, *H. concinna*, *H. arbustorum*, *H. rotundata*, *Bulimus obscurus*, *Zua*, *Pupa umbilicata*, and *Clausilia rugosa*.

VERTEBRATE ZOOLOGY.—Mr. J. G. Brass supplies the following notes :—

Mammalia.—Red Deer and Fallow Deer (in parks). The Badger and Marten are now extinct, though the wardens' accounts in the neighbouring churches record payments for their destruction. The Squirrel, Hedgehog, Water Vole, Shrew, Long-tailed Field Mouse, Brown Rat, Mole, Stoat, Fox, Weasel, Rabbit and Hare are common. A large Otter was recently killed at Rokeby. Several kinds of Bats occur, but the species have not been determined. Dormouse (once, many years ago).

Birds.—The most noteworthy birds occurring at Rokeby and the vicinity are :—Merlin, Rough-legged Buzzard, Long-eared Owl, Short-eared Owl, Tawny Owl, White Owl, Great Grey Shrike, Red-backed Shrike, Pied Flycatcher, Dipper, Ring Ousel, Stonechat, Blackcap, Garden Warbler, Whitethroat, Lesser Whitethroat, Wood Warbler, Chiffchaff, Goldcrest, Snow Bunting, Brambling, Tree Sparrow, Hawfinch, Siskin, Crossbill, Raven, Jay, Green Woodpecker, Lesser Spotted Woodpecker, Tree Creeper, Kingfisher, Nightjar. Stock Dove, Black Grouse, Red-legged Partridge, Golden Plover, Heron, Curlew, Sandpiper, Woodcock, Snipe, Jack Snipe, Dunlin, Water Rail, Teal, Scaup Duck, Red-breasted Merganser.

Reptiles, etc.—Ringed Snake, Adder (rare on moorlands), Lizard, Slow Worm, Newts (species not stated), Frog, and Toad.

Fish.—Loach, Bullhead, Grayling (rare), Chub, Perch (in reservoirs, etc.), Sharp-nosed Eel, Broad-nosed Eel, Minnow, Trout, Salmon, Bull Trout & Sea Trout.

MICRO-ZOOLOGY AND MICRO-BOTANY.—There appears to be no information under this heading.

DURHAM RECORDS.—Members are requested to note that as the scene of the present excursion, although wholly in Yorkshire, is close to the border of Durham County (the Tees being the dividing-line), it is desirable that any records made in and for Durham should be distinctly indicated, so as to avoid confusion.

PRESERVATION OF RARE PLANTS AND ANIMALS.—It is confidently anticipated that members will do all in their power to discourage the uprooting of ferns and rare plants, or the too free collection of rarities of any kind.

PROGRAMME OF MEETINGS.—

3-35 p.m.—Train leaves for Darlington.
4-15 p.m.—Meat Tea, 2/- each
5- 0 p.m.—Sectional Meetings
5-30 p.m.—General Meeting

} All at the North Eastern Hotel, Darlington.

Yorkshire Naturalists' Union.

President :

CHARLES P. HOBKIRK, F.L.S., Dewsbury.

Hon. Secretaries :

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
Rev. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.
EDGAR R. WAITE, F.L.S., Philosophical Hall, Leeds.

THE NINETY-EIGHTH MEETING

WILL BE HELD AT

PENISTONE,

FOR

DUNFORD BRIDGE,

AND THE UPPER VALLEY OF THE DON,

ON

SATURDAY, 9th July, 1892.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party fares will be issued at Darlington and all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways, which have booking arrangements for Penistone and Dunford (with liberty to break the return journey at Penistone), to Members and Associates of the Y.N.U. producing their signed card of membership.

Members wishing to spend the week-end in the district may book on Friday or Saturday with liberty to return on Monday night.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination ; the reduction of fare will be granted for both portions of the journey.

ROUTES.—The main parties will leave Dunford Bridge Station at 11-30 a.m.

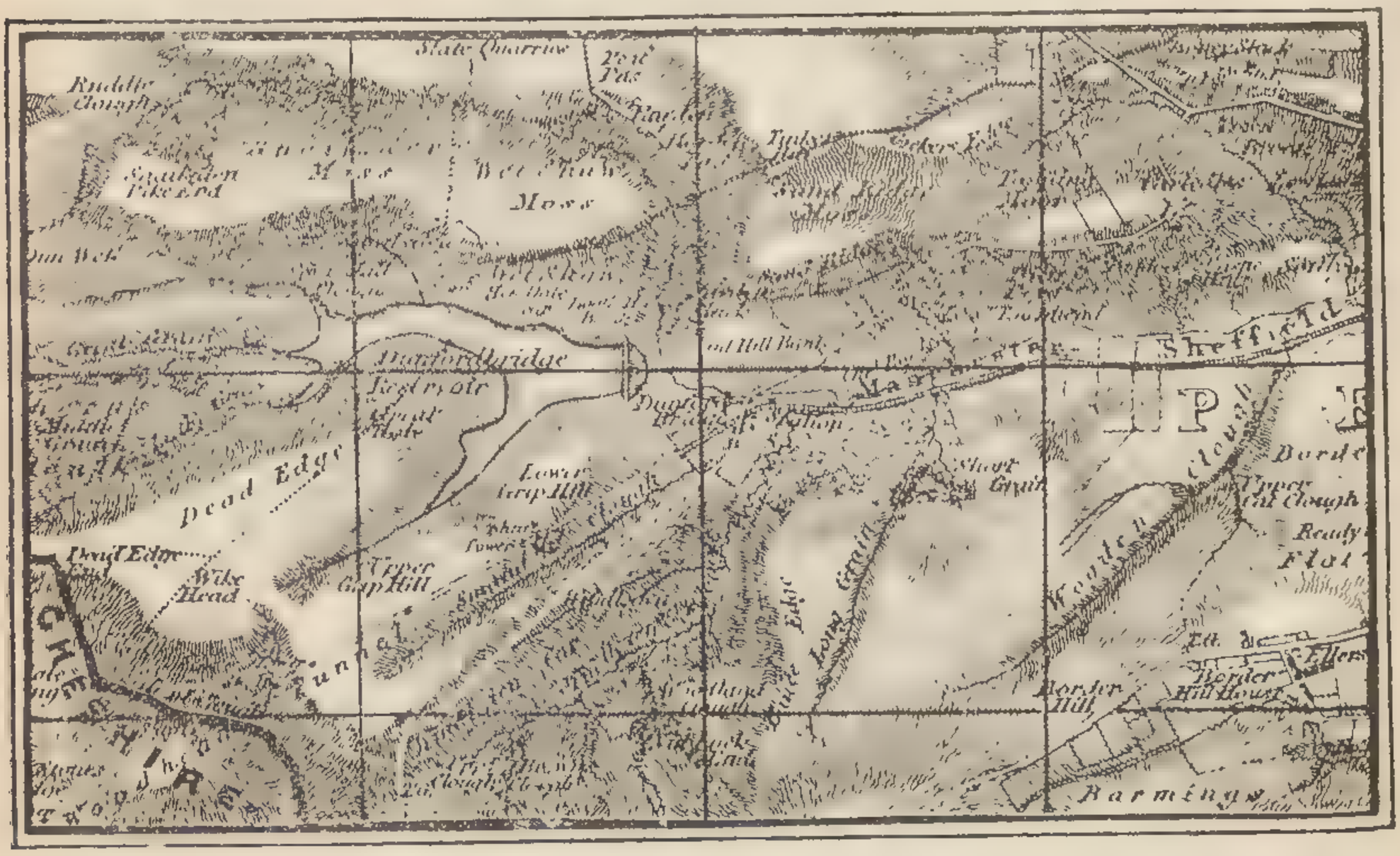
I.—The geologists will be under the leadership of Mr. James W. Davis, F.G.S., F.L.S.

II.—The general body of naturalists, under the guidance of Messrs. Alfred Clarke, J. S. Dransfield and S. L. Mosley will visit the Dunford Bridge Reservoir and will explore the moors in the neighbourhood.

III.—A party of conchologists, leaving Penistone station at 10-35 a.m., will investigate Scout Dam and Gunthwaite, under the charge of Mr. L. E. Adams, B.A. and Master R. Nash.

Permission for the investigation of their estates has been kindly granted by Col. W. S. Stanhope, Mr. Charles Chapman, and the Dewsbury and Heckmondwike Water Works Board.

BOOKS AND MAPS.—The whole of the district for the day's investigation is comprised within Sheet 88 S.E. one-inch ordnance map (which may be had coloured for both solid and superficial geology). Davis and Lees' 'West Yorkshire,' chap. x. contains geological and botanical information on the district. The 'Vertebrates of Huddersfield,' by S. L. Mosley, may also be consulted.



EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

GEOLOGY.—Mr. James W. Davis, F.G.S., F.L.S., writes:—The district about Penistone and Dunford Bridge is composed of millstone grit and lower coal measures. The scenery is much diversified by high moorland hills and deep valleys and is drained by the River Don and its tributaries. The Don has its source at Dun Well, a short distance south of the rocky ravine at Ramsden Clough, in which a fine sequence of the rocks between the Kinder Scout and the third grits is exposed. Other rivulets join the main stream and converge in the artificial lake at Dunford Bridge. The effluent water pursues an eastward course to Penistone, and is joined by the streams from Windledon, Wogden and other cloughs. For some distance the river runs in a deep valley of millstone grit rocks, then cuts across the outcrops of the sandstones and shales of the coal measures. At Penistone the Don is joined by Scout Dyke from the north. The hills are mostly capped by the Penistone flag rock. The series of intersecting valleys have been formed by the abrasion of the flag-rock and the wearing away of the shales beneath. The Penistone flag-rock—the equivalent of the Elland flag-rock further north—in this district reaches a thickness of two hundred feet, and consists of three distinct beds of flaggy sandstone, separated by shales and containing traceable beds of coal. Between these flag-rocks and the rough rock there are about eight hundred feet of shales, sandstones and coals. The latter comprise hard and soft bed coals beside two or three other beds of less value. The rough rock, two or three miles south of Penistone, extends in a northerly direction, separated from the coal measures by a fault on the east; westward it forms the summit of Whitwood Moor, Cliff Edge, and Widdop

Cliffs, resting conformably on the third grit rocks. The rough rock may be thence traced by Borderhill to Dunford Bridge, from which it occupies the tract of Scholes Moor to Holmfirth.

BOTANY.—Mr. S. L. Mosley, F.E.S., says the following plants are recorded: *Adoxa moscatellina*, common at Gunthwaite; *Orchis runscifera*, received from Penistone; and *Trolleus enropæa.*

Mosses and Hepatics.—Mr. Charles P. Hobkirk, F.L.S., writes that far as he knows very little has been recorded of the Flora of this immediate district, therefore new finds are very probable; and he would recommend that every plant noticed should either be recorded or gathered. More particularly should this course be adopted with regard to the Mosses and Hepatics, and their special localities noted. Carices, grasses, &c., should also be well searched for as well as the various species and varieties of *Sphagnum* all of which should be gathered in quantity if possible; if these are sent to him he will do his best to report on them. The only plants of which he has any certain knowledge of having been found on these Moors, are:—*Ranunculus Lenormandi*, *Drosera rotundifolia*, *Rubus Chamæmorus*, *Chrysosplenium oppositifolium*, *Wahlenbergia hederacea*, *Empetrum nigrum*, *Erica cinerea*, *E. tetralix*, *Calluna vulgaris*, and *Habenaria bifolia.* Various species of *Vaccinium* and *Eriophorum* should be found.

ENTOMOLOGY.—Lepidoptera.—Mr. W. E. Brady writes:—The moors around Dunford Bridge are interesting ground for lepidopterists. The number of species in such a locality is naturally smaller than a woodland district would produce, but this is fully compensated for by the great tendency to variation shown by many of the common species. The following and many others may be met with:—Larvæ of *Cidaria testata*, *C. populata* and *Larentia didymata*; the last may be on the wing also, and is then, especially the female, often much paler than the type, contrary to the tendency to dark variation which the species of this locality usually exhibit. In imagines *Fidonia atomaria* and *F. piniaria* are common; *Larenta cæsiata* (if the date be not a little too early) abundant and dark; *Thera variata* occurs; *Hypsipetes elutata* developes beautiful dark forms with copper coloured markings; *Coremia munitata* is scarce, and *Acronycta menyanthidis*, *Hadena glauca*, *Anarta myrtilli* and *Phytometra ænea*, etc., may be expected.

Mr. Jno. Harrison, F.E.S., Barnsley, has taken the following micro-lepidoptera in the district:—*Tortrix vibuknana* and larvæ of *Penthina sauciana* (if not on the wing), *Pædisca solandriana* on birch, rich in variety; *P. occultana* on fir trees hung in webs, and *Exapate congelatella.*

A special look out should be kept for the larvæ of the rare *Lasiocampa ilicifolia*—writes Mr. S. L. Mosley, F.E.S. It has been taken near Sheffield and also near Ripon, and there is no reason why it should not occur on the high grounds about Penistone; the place is very likely, and Mr. Rose, of Barnsley, suspects that he has once seen the larvæ there.

Coleoptera.—Specimens of every species seen should be taken, as upland forms, even of common species, often differ considerably from the lowland individuals. *Miscodera arctica* should be looked for, and various species of *Bradycellus*; *B. cognatus* and *B. similis* will be sure to be common under stones. *Bembidium brunnipes* he has taken, and *B. nigricorne* should be sought at the roots of grasses. *Pterostichus parumpunctatus* has been taken on the western slope of the hills.

Other Orders.—Little has been done, however, in any order of insects in the district, and very full collections should be made. Persons not entomologists often see peculiar insects on these excursions; it would be a great help if each member would carry a few small pill-boxes in which to secure anything they thought unusual, and hand such finds at the proper time to someone interested in the department.

CONCHOLOGY.—Mr. Lionel E. Adams, B.A., mentions that the district is extremely poor in mollusca, owing to its formation of millstone grit. Seven aquatic and twenty-eight terrestrial species (including slugs) have been recorded. Scout Dam, however, contains some interesting distorted and labiate forms of *Limnæa peregra* and scalariform *Planorbis albus*; while a particularly clean and perfect form of the latter occurs in a pond at Gunthwaite Hall. *Limnæa glabra* and *Sphærium lacustre* are found in a small pond at Thurgoland. In Gunthwaite Wood, *Zonites glaber* v. *viridans* (one specimen), *Helix aculeata*, and *Vertigo substriata* (one specmen), have been taken, besides several other commoner species.

Mr. Adams, of Rose Hill, Penistone, will be happy to show his Collections of British Shells and Mammalian Skulls to any members interested in those branches of Natural History.

VERTEBRATE ZOOLOGY.—

Mammalia.—Mr. Lionel E. Adams, B.A., writes:—Though the following mammals occur in the neighbouring woods and on the moors, few are likely to be met with in the exact route under investigation. Fox, Stoat, Weasel, Mole, Common Shrew, *S. pygmæus* (one doubtful specimen), Hedgehog, Squirrel. Hare, Rabbit, Brown Rat, Water Vole, Field Vole, Long-tailed Field Mouse, and House Mouse, one small Bat (species undetermined), has been noticed.

Birds.—Mr. S. L. Mosley, F.E.S., states—Amongst the rarities recorded from the district are the following: Purple Sandpiper, Grey Phalarope, Temmninck's Stint, Great Northern Diver, White Stork, Sheldrake, Waxwing, Rough-legged Buzzard, Hen Harrier, Tawny Owl, Long-eared Owl, Short-eared Owl, and Ring Ousel. Particulars of several of the rarer ones are given in 'Vertebrates of Huddersfield' (6d.), by S. L. Mosley; but little has been done on the eastern or southern slope of the range.

Mr. Edgar R. Waite, F.L.S., remarks that when in the district a month ago the commonest bird appeared to be the Sandpiper, which was no doubt nesting on the banks of the Dunford Bridge and Windledon Reservoirs. A sharp look-out should be kept for Dunlin, which are known to occur in the immediate neighbourhood. The streams appear well suited for the Dipper, and on higher ground the Ring Ouzel will probably be seen. All birds, etc., seen should be carefully recorded, as the district does not appear to have been adequately investigated.

MICRO-ZOOLOGY AND MICRO-BOTANY.—There appears to be no information under this heading.

PRESERVATION OF RARE PLANTS AND ANIMALS.—It is confidently anticipated that members will do all in their power to discourage the uprooting of ferns and rare plants, or the too free collection of rarities of any kind.

PROGRAMME OF MEETINGS.—

5-11 p.m.—Train leaves Dunford Bridge for Penistone.
5-30 p.m.—Meat Tea, 2/- each
6-30 p.m.—Sectional Meetings
7- 0 p.m.—General Meeting

} All at the Wentworth Arms Hotel, Penistone.

Yorkshire Naturalists' Union.

President:

CHARLES P. HOBKIRK, F.L.S., Dewsbury.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.
EDGAR R. WAITE, F.L.S., The Museum, Leeds.

THE NINETY-NINTH MEETING

WILL BE HELD AT

WITHERNSEA,

FOR THE COAST BETWEEN

TUNSTALL AND DIMLINGTON, also for WINESTEAD, KEYINGHAM DRAIN, &c.

ON

Bank-Holiday Monday, Aug. 1st, 1892.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party fares will be issued at Darlington and all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland. and N. E. Railways, which have booking arrangements for Withernsea, with liberty to break the journey at Winestead and Patrington, to Members and Associates of the Y.N.U. producing their signed card of membership.

Members wishing to spend the week-end in the district, may book on Friday or Saturday, with liberty to return on Monday night.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

TIDE.—The water will be low about 2 p.m., and will therefore be exceedingly favourable.

ROUTES.—All parties will leave Hull by the 9-50 a.m. train.

I.—The geologists will be under the leadership of Mr. Alfred Harker, M.A., F.G.S., accompanied by Messrs. F. F. Walton. F.G.S., and J. W. Stather. On arriving at Withernsea at 10-51 they will proceed by conveyances to Out Newton. Members will then walk to Dimlington, whence the cliff will be examined toward Withernsea. Members requiring conveyances must take care to advise Mr. Lawtey, Pier Hotel, Withernsea.

II.—Another party, who will be accompanied by Messrs. J. F. Robinson, G. H. Hill, and other members of local societies will leave the train at Winestead and proceed by Winestead Old Hall and Woods, by South Frodingham to Rimswell and Withernsea.

III.—Messrs. F. W. Fierke, C. Waterfall, and T. Petch, B.A., will attend a third party leaving Withernsea for the coast northward to Tunstall. Keyingham drain and Sand-le-Mere will be examined and the party will return to Withernsea by the Waxholm Road.

CIRC. NO. 99.

WEEK-END ARRANGEMENTS.—Members of the Union who are desirous of becoming acquainted with the Holderness district and propose a two or three days' excursion are cordially invited to join the members of the Hull Scientific Club and the Hull Field Naturalists' Society who will meet at 2-30 p.m., on Saturday, July 30th, at the corner of Spring Bank and Beverley Road, Hull, for an excursion to Dunswell Lane, a favourite district for botanical and zoological work. No effort will be spared by the members of these societies to make their visit profitable from a natural history point of view. The visitors may be well accommodated at the Imperial Hotel, Hull (close to the Paragon Railway Station) or the Pier Hotel, Withernsea.

Permission for the investigation of their estates has been kindly granted by Messrs. Walter Bailey, J.P., James Reckitt, J.P., G. W. Dickinson, J.P., Thos. Holden, George Clark, Edward Clark, and J. Biglin.

BOOKS AND MAPS.—The whole of the district for the day's investigation is comprised within Sheet 85 one-inch ordnance map (which may be had geologically coloured). The following works may be consulted for geological information: S. V. Wood and J. L. Rome: On the Glacial and Post-Glacial structure of Lincolnshire and South-east Yorkshire, Quart. Journ. Geol. Soc., vol. xxiv., p. 146; G. W. Lamplugh: East Yorkshire during the Glacial Period, Rep. Brit. Assoc. for 1890, p. 798; Clement Reid: The Geology of Holderness, Mem. Geol. Surv. (1885) price 4s. The last-named memoir gives a full account of all that is known of the geology of the district.

PHYSICAL GEOGRAPHY AND GEOLOGY.—Mr. Alfred Harker, M.A., F.G.S., communicates the following:—Excepting certain superficial deposits Holderness is built entirely of glacial accumulations. At the beginning of the Great Ice Age the district was a broad bay, the coast-line corresponding roughly with the eastern boundary of the chalk as now exposed. The great Norwegian ice-sheet advanced across the North Sea until it reached the cliffs of Yorkshire, which it overrode only to a slight extent. It dammed back, however, the British ice, which was thus diverted in a southerly direction. The main branch of this native ice was the great Teesdale glacier, which headed probably in the Lake District of Cumberland. The higher part of the chalk wolds was never covered by ice. The coast-line of Yorkshire, and especially the Bay of Holderness, was the battle field of the two opposing ice-streams, and in the mingled terminal moraines, which form the Basement Boulder Clay, we find boulders of the gneisses, crystalline schists, and peculiar igneous rocks of Norway side by side with the local chalk and Jurassic rocks, the Carboniferous strata and Whin Sill of Teesdale, and stray specimens from the Cumberland hills and the Eden Valley. This basement clay is seen at Dimlington. There and elsewhere shell-bearing patches have been exposed, representing portions of the sea bottom ploughed up by the front of the Norwegian ice-sheet. The next stage in the history was a partial recession of the ice, so that in certain tracts stratified silt, sand, and gravel were irregularly laid down, while elsewhere boulder-clay (the 'Purple Clay') continued to form. This intermediate series is followed in the Holderness sections by the Upper Boulder Clay (including the reddish 'Hessle Clay'), which seems to indicate an advance of the British ice with some recession of that coming from Norway. The preponderance of Yorkshire rocks among the boulders is greater than in the Basement Clay.

Among deposits of later date the most important are the numerous fresh-water marls, peat beds, etc., marking a time when a large part of Holderness was covered by a chain of meres like the Norfolk broads. Excepting Hornsea Mere these are now all silted up, but sections of them are very common in the sea cliffs, two or three being exposed between Withernsea and Dimlington. The most striking geological process now in progress in the district is the rapid destruction of the coast by the sea, the loss, despite various protective works, being estimated at between two and three yards *per annum*. Owing to this cause and the shifting of the beach by storms, the sections exposed in the cliffs are continually changing, and any detailed description would be of little use after a short lapse of time.

BOTANY.—Although the district mapped out for investigation has received little or no attention from the Hull botanists the immediate neighbourhood has been fairly worked with most encouraging results. Possibly we may yet learn that Withernsea has been unwisely neglected and that it will prove equally productive with the rest of Holderness. Holderness, taken as a whole, is, to say the least, a characteristically productive region, and, on account of its aquatic flora, it would well repay any botanist whose investigations have been confined to the moorlands to make two or three days' stay whilst in the neighbourhood, as there are many interesting plants he may not have met with previously.

Mr. J. F. Robinson states that during the seven years he has resided in Holderness the investigation of the dykes and drains which intersect the land has well repaid him and served him as a good substitute for the terrestrial forms which the district lacks. He adds that the following may be found, some very commonly, other more rarely. *Nuphar luteum*, *Nasturtium amphibium*, *Stellaria palustris*, *Hippuris vulgaris*, *Myriophyllum verticillatum* and *M. spicatum*, *Apium graveolens*, *Œnanthe phellandrium*, *Hottonia palustris*, *Lysimachia nummularia*, *Samolus valerandi*, *Pedicularis palustris*, *Utricularia vulgaris*, *Rumex hydrolapathum*, *Typha latifolia* and *T. angustifolia*, *Sparganium simplex*, *Lemna trisulca* and *L. polyrrhiza*, *Alisma ranunculoides*, *Hydrocharis morsus-ranæ*, *Sagittaria sagittifolia*, *Butomus umbellatus*, *Potamogeton crispus*, *P. pectinatus*, *P. densus*, *Zannichellia palustris*, *Scirpus lacustris* and *Carex divisa*.

Mr. Charles Waterfall, who has been over the ground from Withernsea by Sand-le-Mere to Thirtle Bridge, enumerates the following additional plants as having been seen by him: -*Stellaria media* var. *neglecta* and *Silaus pratensis*, Waxholme Road; *Anthyllis vulneraria*, *Centaurea nigra* (rayed form), Waxholme Cutting; *Lemna gibba*, pond near Waxholme; *Juncus compressus*, *Carex arenaria*, *C. punctata*, and *Psamma arenaria*, Sand-le-Mere; and *Ononis spinosa* near Thirtle Bridge.

Mr. Geo. H. Hill and Mr. Peak state that essentially the flora of Withernsea is that of Hornsea, minus the plants of the Mere, and mention the following as to be found, in addition to those cited by Mr. Robinson and Mr. Waterfall: *Convolvulus soldanella*, *Linum catharticum*, *Ophioglossum vulgatum*, *Iris fœtidissima*, etc.

Cryptogamia.—There appears to be no records whatever of Mosses, Hepatics, Lichens, Fungi, or Algæ, consequently a productive field is open for investigation.

ENTOMOLOGY.—

Lepidoptera.—Messrs. J. W. Boult and M. Waller state that although from an entomological point of view Withernsea has never been an attractive locality, the greater part of the district, particularly in the direction of Winestead, which forms part of the day's programme is open to investigation. The following insects are on record as having been observed in the immediate neighbourhood of Withernsea itself: -*Vanessa io*, *Smerinthus populi*, *Acherontia atropos*, *Zygæna filipendulæ*, *Bombyx quercus*, *Dicranura vinula*, *Notodonta ziczac*, *N. dictæa*, *Cucullia umbratica*, *Plusia iota*, etc. When in the district a month ago, Mr. Edgar R. Waite, F.L.S., saw hybernated examples of *Vanessa cardui* numerously on the wing, and if thistles are searched no doubt the larvæ or pupæ will be found.

Coleoptera.—Mr. W. F. Baker believes the district to be well worth the attention of coleopterists notwithstanding that the time of the year is not usually the most favourable for conducting operations. The ponds on the coast north of Withernsea especially seem to be very productive. In one of these ponds *Agabus nebulosus* has been taken, as also that interesting water beetle, sometimes popularly known as the squeaker beetle, *Pelobius turdus*, which is the only record of it, to his knowledge, for the Holderness district. *Anomala frischii* occurs on the coast at Sand-le-Mere.

CONCHOLOGY.—Mr. F. W. Fierke, of Hull, writes:—The local conchologists will be glad to conduct members who intend to spend the week's end in the district over some of the best conchological grounds in the vicinity. The aquatic

mollusca are well represented in Holderness, owing to the numerous marshes, dykes and drains; especially the amber-coloured shells such as *Succinea*, *Physa*, and *Limnæa glutinosa*, are noteworthy on account of their form, texture, colour, etc.

As regards the district in which Monday's investigations will be confined, our knowledge is exceedingly limited, Withernsea being an out-lying district, which, in regard to its molluscan fauna, has received very little attention. It is, however, well supplied with ditches and drains, which ought to be fairly productive, and it is anticipated the list here given will be considerably augmented. The species named occur near the coast north of Withernsea between that place and Sand-le-Mere, and in a westerly direction to Thirtle Bridge—the whole of the Winestead route remaining unexplored. Aquatic:—*Sphærium corneum*, *S. lacustre*, *Pisidium fontinale*, *P. pusillum*, *Bythinia tentaculata*, *Planorbis nautileus* and var. *crista*, *P. vortex*, *P. carinatus*, *P. complanatus*, *Physa fontinalis*, *Limnæa peregra*. Terrestrial:—*Arion ater*, *Arion minimus*, *Agriolimax agrestis*, *Succinea putris*, *Vitrina pellucida*, *Hyalina cellaria*, *H. alliaria*, *H. crystallina*, *Helix nemoralis*, *H. hispida*, *H. virgata* and var. *submaritima*, *H. caperata*, *H. rotundata*, *H. pulchella*, *Pupa umbilicata*, *Cochlicopa lubrica*, and *Carychium minimum*. The lacustrine deposits at Out Newton and Holmpton might also claim the attention of the conchologists; but they do not come within the area of their operations unless they join the geological party.

Mr. J. D. Butterell, M.C.S., of Beverley, states that he has found *Amalia gagates* on the cliffs at Withernsea, and a *Vertigo* (probably *pygmæa*) on the road to Holmpton, besides other species named in Mr. Fierke's notes.

VERTEBRATE ZOOLOGY.—Mr. F. Boyes, of Beverley, writes:—The district to be explored comprises a small portion of that wide extent of almost level country stretching from the Wolds to the sea called Holderness. The physical features are by no means varied and the fauna will include little of special interest, it will, however, show the character of animal life to be met with throughout almost the whole of this portion of the East Riding.

Mammalia.—Fox, Hare, Rabbit, Stoat, Weasel, Rat, Mole, Water Vole, Shrew, Water Shrew, Long-tailed Field Mouse, Short-tailed Field Vole, House Mouse, Noctule and Pipistrelle, etc.

Birds.—There will be the usual complement of our smaller resident and summer migrant birds, and probably a few migrant waders on the shore, and almost anything might be expected there at this season of the year although somewhat early.

Reptiles, etc.—Mr. Waite has taken *Triton cristatus* in a pond north of Withernsea, and considers that the reported occurrence of *Lacerta agilis* in the district requires confirmation.

Fish.—Mr. H. M. Foster gives the following list of freshwater fishes found in the district:—Trout, Pike, Roach, Perch, Dace, Chub, Bream, Gudgeon, Broad-nosed Eel, Sharp-nosed Eel, Minnow, Three-spined Stickleback, Ten-spined Stickleback, Burbot (rare), Stone Loach, Bullhead, Flounder, and Lampern.

MARINE ZOOLOGY.—

There does not appear to have been very much done in this department, except that Mr. J. Darker Butterell, of Beverley, made a few notes last year. During a very low tide he examined the submerged forests at Withernsea and Sand-le-Mere. Two species of *Pholas* had bored into the remains in large numbers, but no living examples could be found. There was little or no life on the black clayey remains beyond a few Zoophytes; no Anemones were seen. Shrimps and Sandhoppers were plentiful, and the shrimpers turn up young Turbot of the size of a half-crown, and other small fish, including what they call the Sting Fish. The Shore Crab seems to be very scarce, and only a few were seen of one species of the swimming crabs.

PROGRAMME OF MEETINGS.—

4-30 p.m.—Meat Tea, 2/- each
5-15 p.m.—Sectional Meetings
5-30 p.m.—General Meeting
} All at the Pier Hotel, Withernsea.
6-28 p.m.—Train leaves for Hull.

Yorkshire Naturalists' Union.

President:

CHARLES P. HOBKIRK, F.L.S., Dewsbury.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.
EDGAR R. WAITE, F.L.S., The Museum, Leeds.

THE HUNDREDTH MEETING

WILL BE HELD AT

COXWOLD,

FOR THE INVESTIGATION OF

NEWBURGH and GILLING PARKS, BYLAND ABBEY, and PART OF THE SOUTHERN ESCARPMENT OF THE HAMBLETON HILLS,

On THURSDAY, 15th SEPTEMBER, 1892;

AND WILL BE PRECEDED BY A

FUNGUS FORAY,

WITH HEAD-QUARTERS AT

MALTON,

On WEDNESDAY, 14th SEPTEMBER, 1892.

This excursion is planned for two days, of which the principal one will be the second. Members not able to attend both days and able to choose, are requested to attend on the Thursday.

RAILWAY ARRANGEMENTS.—Return tickets at pleasure party fares issued at Darlington and all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N.W., M.S. & L., Mid., and N.E. Railways, for **COXWOLD, GILLING,** or **MALTON** (with permission to break the journey at Coxwold, or Gilling, or Castle Howard) to Members and Associates producing signed card of Membership. Members wishing to stay the whole excursion may book on Tuesday to return on Friday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient juuction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

PERMISSION is granted by Sir George Wombwell, Mr. Hugh C. Fairfax-Cholmeley, and the Rev. T. A. Burge, Prior of Ampleforth College.

BOOKS AND MAPS.—The scene of Thursday's excursion is in parts of Sheets 52 (96 S.W.) and 53 (96 S.E.), one-inch Ordnance Maps (also published geologically-coloured); and of Wednesday's wholly in Sheet 53. Geological and botanical information may be found in both editions of Baker's 'North Yorkshire.'

MYCOLOGISTS are cordially invited to visit Yorkshire and join in the investigations. Mr. Geo. Massee, F.R.M.S. and Dr. M. C. Cooke have already intimated their intention of being present, and Messrs. H. T. Soppitt, of Bradford; Charles Crossland, of Halifax; A. Clarke, of Huddersfield; Rev. Wm. Fowler, M.A., of Liversedge; Messrs. J. W. Sutcliffe, of Halifax; W. N. Cheesman, of Selby; Joseph Sutcliffe, of Huddersfield; M. B. Slater, F.L.S., of Malton, will also be present and take part in the investigations. Mr. Massee and Dr. Cooke will arrive on Monday night, in readiness for a preliminary ramble on Tuesday. Members desirous of joining them on that day may ascertain particulars from the Secretaries.

WEDNESDAY'S PROGRAMME.—Leave Castle Howard Railway Station at 9-24 a.m. for Castle Howard Park, Terrington Carr, Cumhag Wood, etc., returning to Malton by conveyances leaving Coneysthorpe at 4 p.m.

Meat Tea, 2/- each, at 5-15 p.m. at the 'George' Hotel, Malton.

At 6-30 p.m. the arrangement of the Show will be proceeded with and an informal gathering held at the Assembly Rooms.

FUNGUS SHOW.—An exhibition of Fungi at the Museum will be arranged on Tuesday and Wednesday Evenings and remain open on Thursday. Parcels of Fungi very acceptable from other parts of Yorkshire, if packed in boxes with moss or bracken (not in paper), and sent carriage paid so as to reach Malton by Tuesday noon. Localities to be stated.

The Secretaries would be particularly glad to hear from members who intend to be present on Wednesday Evening and are willing to assist in arranging the Show.

THURSDAY'S ROUTES.—

I.—The Geologists, in charge of Rev. T. A. Burge, and Mr S. Chadwick, F.G.S., will leave Gilling Station at 9-27, and work westward to Coxwold.

II.—A party of Naturalists will leave Gilling Station at 9-27 a.m., and work through Gilling and Newburgh Parks to Coxwold.

III.—Another party will leave Coxwold Station at 9-14 a.m., visit Byland and the slopes of the Hambletons, returning to Coxwold.

Routes II and III will be under the guidance of Malton and local members, and it is expected that Dr. Cooke and Mr. Massee will accompany one of these parties.

HOTEL ACCOMMODATION.—Members will find good accommodation at the 'Talbot,' 'George,' and 'Crown' Hotels at Malton.

GEOLOGY.—Mr. C. Fox-Strangways, F.G.S., writes:—The geology of the neighbourhood of Coxwold is chiefly interesting from the two large faults which intersect the Oolites near that place and cause a long strip of these formations to outcrop much further to the west than the main mass of the rock. These faults can be traced from the neighbourhood of Malton to that of Ripon, a distance of about thirty

miles. The effect of the northern fault is very well seen in the quarry at Snape Hill, which certainly ought to be visited. Here we have a fine section of the upper calcareous grit and coral rag—beds higher than anything seen in the Hambleton escarpment close by, faulted down against the shales of the upper lias, which were worked for jet, close by. Standing in this quarry and looking up at the rocks of Roulston Scar towering above one's head to the north is very impressive, and gives a good idea of the throw of this fault. Another point of much interest in this district is the much more arenaceous character of most of the rocks, showing that we are here approaching the original limit of these rocks and the shore-line from which the sediment was obtained. The peculiar character of the Kellaways Rock at the foot of Roulston Scar, and the thinning out of the Oxford Clay between this point and Whitestone Cliff, are also objects well worthy of study.

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

BOTANY.—In 'North Yorkshire,' Mr. J. Gilbert Baker speaks of the Howardian tract (of which a portion is included in the present excursion) as furnishing a great variety of situation, and although possessing none of the more decidedly montane plants, yet yielding as many of the rarer species as are to be found within an equal area anywhere in North Yorkshire, Upper Teesdale alone excepted. These remarks are followed by a long list, including nearly 150 species, from which Mr. M. B. Slater, F.L.S., has selected the following as occurring in the neighbourhood of Coxwold:—

Phanerogamous Plants—*Ranunculus circinatus, R. lingua, Stellaria nemorum, Radiola millegrana, Hypericum montanum, Rubus guntheri, Scrophularia vernalis, Lathræa squamaria, Mentha sylvestris, Calamintha officinalis, Salix nigricans, Arundo calamagrostis, Brachypodium pinnatum.*

Mosses—*Brachyodus trichodes, Anodus donianus, Tortula marginata, Mnium cuspidatum, Philonotis calcarea, Fissidens pusillus, Eurhynchinum crassinervium, E. pumilum, Hyocomium flagellare, Rhynchostegium depressum.*

ENTOMOLOGY.—Although the district has all the appearance of being a 'land of promise,' it seems to have been quite neglected by entomologists.

Lepidoptera.—Mr. William Hewett, of York, observed the following Lepidoptera in Wass Wood on the 14th of July:—*Asthena blomeri*, *Larentia didymata*, *Aplecta nebulosa*, *Hepialus hectus*, *Cabera pusaria*, *C. exanthemaria*, *Acronycta rumicis*, pupæ of *Abraxas grossulariata*, also, in the immediate neighbourhood, *Larentia pectinitaria*, *Macaria liturata*, *L. cæsiata*, and *Chortobius pamphilus*. Messrs. J. and W. Hawkins, of York, whilst in the neighbourhood about ten days later obtained larvæ of *Vanessa cardui*, *V. atalanta*, and *V. urticæ*, also *Eriogaster lanestris*. From the little Mr. Hewett saw of the district he considers it likely to be a good one, both entomologically and ornithologically.

Coleoptera.—*Strangalia armata* is common in similar woods at Sessay near Pilmoor Junction.

CONCHOLOGY.—Conchologically this district seems to be absolutely unknown, but likely to be tolerably productive.

VERTEBRATE ZOOLOGY.—The district is well wooded and diversified in character, and is likely to be most productive in Birds and Mammals, although the only actual records appear to be Ringdove, Jay, and Mole.

AMATEUR PHOTOGRAPHERS.—The Rev. T. A. Burge will kindly place his dark-room at Ampleforth College at the disposal of Photographers.

MICRO-ZOOLOGY AND MICRO-BOTANY.—There appears, as usual, to be no information available on these subjects.

PROGRAMME OF THURSDAY'S MEETINGS.—

4-30 p.m., Meat Tea, 2/- each
5-15 p.m., Sectional Meetings
5-30 p.m., General Meeting

} All at the Fauconberg Arms Inn, Coxwold.

MALTON NATURALISTS' SOCIETY.

The ANNUAL CONVERSAZIONE will be held in the Assembly Rooms, Malton, on *Thursday, September 15th*, when PROF. MIALL, F.R.S., will give a LECTURE at 8-0, on 'TRANSFORMATIONS OF ANIMALS." Members of the Union who wish to hear the Lecture will be able to leave Malton for York at 10-30 p.m.

ANNUAL MEETING.

The Honorary Secretaries venture to remind the Members and Associates that the forthcoming ANNUAL MEETING, to be held at HUDDERSFIELD, on *Tuesday, November 15th*, is to be one of exceptional interest, being the 101st Meeting of the Union.

The PRESIDENTIAL ADDRESS, to be given by MR. CHARLES P. HOBKIRK, F.L.S., will deal with the Union itself, its origin, history, and methods of work, and the Huddersfield members are working hard to render the gathering thoroughly successful.

It is hoped on behalf of the Council, that Members (and particularly all past and present Office-bearers) will make a special effort to be present upon the occasion.

Yorkshire Naturalists' Union.

President:

HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.

Hon. Assistant Secretary:

WALTER FRANCIS BAKER, 18, Hyde Terrace, Leeds.

THE HUNDRED-AND-SECOND MEETING

WILL BE HELD AT

AYSGARTH

FOR THE NEIGHBOURHOOD OF

AYSGARTH AND CARPERBY, BISHOPDALE AND WALDENDALE, and LOWER SLOPES OF PENHILL,

On WHIT-MONDAY, MAY 22nd, 1893.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party fares will be issued at all Yorkshire stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways, which have booking arrangements for Aysgarth, to Members and Associates of the Y.N.U. producing their signed card of membership.

Tickets taken on Friday or Saturday, May 19th or 20th, will be available for return on Monday or Tuesday, May 22nd or 23rd.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination; the reduction of fare will be granted for both portions of the journey.

HOTEL ACCOMMODATION.—Visitors will be accommodated at the Palmer Flatt Hotel for 7/- a day, including attendance. There are hotels in neighbouring towns in the dale, but, as they are always full at Whitsuntide, members intending to spend the week-end should order rooms at once.

ROUTES.—All parties start from Aysgarth Station at 11-18 a.m.

I.—The Geological party, under the leadership of Mr. J. G. Goodchild, F.G.S., of the Geological Survey, will leave Aysgarth Station at 11-18 a.m., visit the Fors, then go through West Burton, over the north end of Penhill, thence to West Witton, and back by Swinethwaite to Aysgarth.

II.—Exploration of the lower slopes of Penhill, beginning at West Burton waterfalls, continuing eastwards as far as Swinethwaite. The return journey to be made along the Yore banks to Aysgarth.

III.—Freeholders' Wood, Carperby (around Aysgarth Station), near the waterfalls, and both sides of the river for a mile above and below this point.

IV.—Described under Botany.

Mr. W. Horne, F.G.S., Rev. F. W. Stow, M.A., Mr. E. Chapman, Rev. G. P. Harris, M.A., and others acquainted with the district will be present and assist in the excursion.

Permission for the investigation of their estates has been kindly granted by Lord Bolton of Bolton Hall, and Mr. Thomas Bradley of Bear Park, but as this is the nesting season, the permission for Lord Bolton's estate does not extend to the moorlands.

BOOKS AND MAPS.—The whole of the district for the day's investigation is comprised within the north-west corner of Sheet 51, formerly 97 S.E., one-inch ordnance map (which may be had geologically coloured). The Geology is described by Phillips in his 'Geology of Yorkshire,' and his 'Mountains, Rivers, and Sea-Coast of Yorkshire'; Baker's 'North Yorkshire' should also be referred to for geological and botanical information, and the following papers and lists may be consulted: 'The Flora of Wensleydale,' by John Percival (Nat., May and June, 1888, pp. 125—143, and 159); 'Conchological Field Notes from Wensleydale,' by W. Denison Roebuck, F.L.S. (Nat., Jan., 1883, pp. 81—87, with Additional Records at pp. 125 and 155 of same volume); and a note on Shells found at Aysgarth, by T. A. Lofthouse (Nat., Aug., 1889, p. 244); 'List of Wensleydale Birds,' by E. Chapman (Nat., June, 1886, pp. 183—188).

PHYSICAL GEOGRAPHY AND GEOLOGY.—Mr. J. G. Goodchild, F.G.S., writes: The parts of Wensleydale around Aysgarth consist almost exclusively of Lower Carboniferous strata, which include the Mountain Limestone whose highest members are seen at Redmire Fors, Aysgarth Fors, and the neighbouring lowlands, and the Yoredale Rocks, here typically developed, which form the greater part of the dale. On the summits of the hills, on both sides of the Yore, the Upper Carboniferous rocks are represented by outlying patches of the lowest members of the Millstone Grit. The strata are but little disturbed and lie in a nearly horizontal position over an area of many square miles around Aysgarth. The Yoredale Rocks consist of a series of sheets of limestone, which are remarkable for retaining both their general character and their average thickness over many hundreds of square miles of the country north of Craven. Each sheet of limestone lies upon a bed of sandstone, and is in turn capped by a bed of shale. Near the top of the Yoredale Rocks occurs a very remarkable series of siliceous beds, which appear to have originated mainly through the agency of sponges. Several mineral veins, chiefly of galena, traverse the rocks, especially on the north side of the valley, and will be examined in detail. The glacial drifts present several features of interest and importance.

CLIMATOLOGY AND METEOROLOGY.—The Rev. F. W. Stow, M.A., F.R.Met.S., Vicar of Aysgarth, who has kept meteorological records for many years, remarks: The climate of Wensleydale is remarkably bracing. The winter temperature does not on an average differ much from that of the Midland and Eastern counties. For instance, Aysgarth was on an average of eight years, 1881-88, less than ½-deg. Fahrenheit colder than Uppingham, and 6-10ths colder than Hillington in Norfolk. Extreme cold is rarer at Aysgarth than in lower-lying situations. The summer is generally cool and breezy. Although the rain-fall is considerable, about 38 inches, yet, owing to the rare occurrence of fogs, the air is on an average drier than at almost any other station in the British Islands. The limestone rock, which does not retain standing water, and the gravel, chiefly of glacial origin, which forms the floor of the valleys, have a good deal to do with this result. From the 'Blue Books' issued by the Metorological Office, it appears that in the seven years, ending 1887, only one station (Llandudno) was decidedly drier than Aysgarth, and another (Leicester) slightly so. When barometrical 'depressions' or 'cyclones' are passing over the British Islands, and especially in autumn or winter, severe rain-storms are experienced in Wensleydale. These are worst near the water-sheds of the Yore, the Eden, the Ribble, and other rivers, and often cause heavy floods in those rivers when little rain has fallen lower down. I have seen a flood come down the Yore in a wave more than a yard high, and it was by such a wave that a son of the late Dean McNeile was drowned at Tanfield, lower down the Yore.

BOTANY.—Mr. John Percival, M.A., F.L.S., recommends members to refer to Baker's 'North Yorkshire, and to 'The Naturalist,' May, 1888. In the latter he has given an account of the flora of the district, and so far no new records have been added. For complete examination of the district, the attention of botanists should be dividedas stated under Routes. These routes include all the richest points of the locality, and a view of the general nature of the flora may be obtained from any *one* of them.

Route II.—On Penhill, *Hieracium cæsium* var. *smithii* (Jack Wood), excellent *H. gibsoni* east of Sorrelsykes, *Agrimonia odorata*, *Lathræa squamaria*.

Route III.—This district is very rich in forms of *Rosa canina*, no less than seventeen occurring in the wood itself. *R. spinosissima*, *R. mollissima* var. *cærulea*, and *R. micrantha*, are met with here. *Trollius europæus*, *Aquilegia vulgaris*, *Cardamine amara*, *Geranium sylvaticum*, *G. columbinum*, *G. lucidum*, *Hippocrepis comosa*, *Geum intermedium*, *Myosotis sylvatica*, *Melampyrum pratense*, v. *montanum*, *Lathræa squamaria*, *Salix phylicifolia*, *Orchis ustulata*, *Gymnadenia conopsea*, *Habenaria viridis*, *Paris quadrifolia*. *Equisetum variegatum* grow about the rocks above the lower falls at Aysgarth. Many interesting transitory 'aliens' occur in the rock crevices and on the river banks below Yore Mills; these are introduced from abroad with wheat, etc., ground at the mills.

Route IV.—Follow the river from Yore Mills up to the stepping stones, about one mile distant, noticing stagnant pools in the 'Strands' pasture, with *Sparganium ramosum*, *Potamogeton rufescens*, *P. pusillus*, *P. natans*, *Hippuris vulgaris*, *Myriophyllum spica'um* and *alterniflorum*, and then. leaving the Yore, go along banks of small stream—Ellerbeck—up to Ox close, paying attention to Hawbank woods, where *Thlaspi alpestre* v. *occitanum*, *Alsine verna*, *Cochlearia officinalis* var. *alpina*, and *Armeria maritima* are abundant. It is worthy of note that *A. maritima* and *Thlaspi alpestre* do not occur in any other part of the valley; they keep to the small stream as far as the main river and there end. Ox close scars and those behind should be examined, if time allows, for *Orobanche rubra* and *Polypodium calcareum*. Late *Hutchinsia petræa* should be met with.

Hippocrepis comosa, *Hutchinsia petræa*, *Saxifraga hypnoides*, *Myrrhis odorata*, *Geranium lucidum* occur in the neighbourhood of Locker Tarn, as well as *Viola lutea*, *Comarum palustre*, *Gnaphalium dioicum*, *Drosera rotundifolia*, *Salix repens*, *Orchis latifolia* and *O. incarnata*, and *Listera cordata*.

CRYPTOGAMS, etc.—There appear to be no records other than for the mosses mentioned in Baker's 'North Yorkshire.'

ENTOMOLOGY, etc.—There do not appear to be any entomological records available, but the district has every appearance of being a likely one for entomological research.

CONCHOLOGY.—Mr. W. Denison Roebuck, F.L.S., writes: The neighbourhood of Aysgarth, although it has only been casually and intermittently worked for mollusca, may be considered a rich one, owing to the prevalence of calcareous rocks and the plentifully wooded nature of the district. About thirty species are recorded for the immediate vicinity of Aysgarth and Carperby, a number which ought to be largely increased by careful search in the woodlands and by the river side. An old limekiln in Bear Park, near Aysgarth Bridge, yields *Helix cricetorum* and *H. lapicida*. Rocks and walls harbour in abundance *Clausilia dubia*, *Cl. perversa*, *Balea*, *Helix rupestris*, *Bulimus obscurus*, *Pupa umbilicata*, (and at Carperby var. *albina*), etc. In the Yore at Aysgarth are found *Neritina*, *Pisidium fontinale*, *Limnæa peregra*, and *Ancylus fluviatilis*, and along its banks and elsewhere in the neighbourhood occur *Arion ater*, *Limax agrestis*, *Vitrina*, *Succinea putris*, *Zonites celiarius*, *Z. alliarius*, *Z. nitidulus*, *Helix hortensis*, *H. arbustorum*, *H. rufescens*, *H. hispida*, *H. rotundata*, *H. pulchella*, *H. sericea*, and *H. caperata*.

An interesting capture here was the double-mouthed specimen of *Clausilia perversa* which Mr. T. A. Lofthouse took in 1889. A careful and systematic search should result in the addition of several slugs to the list, as well as such shells as *Carychium*, *Azeca*, one or two species of *Vertigo*, *Helix fusca*, *H. aculeata*, *H. pygmæa*, and several forms of *Zonites* which are not yet on record. For discovery in water shells the character of the district does not offer much scope, but it is nevertheless quite possible to add one or two to the list. Mr. T. A. Lofthouse agrees in this estimate of the molluscan productiveness of the district, and mentions *Succinea elegans* as also occurring.

VERTEBRATE ZOOLOGY.—Mr. John Percival, M.A., F.L.S., writes that the known mammals include Fox, Badger, Weasel, Stoat, Otter, Water Vole (Ellerbeck), Red Field Vole, Wood Mouse, Shrew, Black Shrew, Water Shrew, Squirrel, Dormouse (rare, Hawbank and Thoresby woods), Mole, and Hedgehog. The Bats are the Noctule (common), Long-eared (rare), and Pipistrelle.

The **Reptiles** are Lizard, Newt, Slow-worm, Toad, Frog, and Grass Snake.

Fishes.—Trout, Salmon, Grayling, Loach, Bull-head, Minnow, Eels, and, occasionally, Chub and Rud. In the Yore below Redmire waterfalls are Pike, Dace, and Barbel.

For a list of the Birds of Wensleydale see 'The Naturalist,' June, 1886.

The larger birds of prey have disappeared, but the Merlin, Sparrow Hawk, and Kestrel are present on the high ground about Locker Tarn. Ring Ousel and Wheatear are common.

Within the last few years a colony of Black-headed Gulls have established themselves at Locker Tarn; Coots and Dabchicks have decreased (in consequence?), but are still met with there. Teal and Mountain Linnet occasionally breed in the heather near the Tarn, where the Grasshopper Warbler may be heard. Redshank, Curlew, and Snipe also breed here.

At the Aysgarth falls, and in the woods near, the following birds are not uncommon:—Dipper, Grey Wagtail, Yellow Wagtail, Kingfisher, Sandpiper, Tree Creeper, Wood Wren, Chiff-chaff, Garden Warbler, Lesser Whitethroat, Redpoll, Bullfinch, Cole and Marsh Tits.

The routes suggested for the Botanical section are also of special interest for Zoologists.

MICRO-ZOOLOGY AND MICRO-BOTANY.—There appears to be no information under this heading.

Amateur Photographers will be able to change their plates at Aysgarth Vicarage by the kindness of the Rev. F. W. Stow, M.A.

MISCELLANEOUS.—Visitors having the opportunity are invited by Mr. Wm. Horne, F.G.S., Market Place, Leyburn, to inspect his collections of fossils and antiquities. Similar collections are also on view at Bolton Castle, and at Carperby Mr. E. Chapman's local specimens of birds are open to inspection.

PROGRAMME OF MEETINGS.—

5- 0 p.m.—Meat Tea, 2/- each
5-45 p.m.—Sectional Meetings
6- 0 p.m.—General Meeting

} All at the Palmer Flatt Hotel, Aysgarth

Departure 0 Trains { 6-52 p.m.—North Eastern for Northallerton and the East.
7-49 p.m.—Midland for Hawes, Skipton, and the West.

Yorkshire Naturalists' Union.

President:

HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds,

Hon. Assistant Secretary:

WALTER FRANCIS BAKER, 18, Hyde Terrace, Leeds.

THE HUNDRED-AND-THIRD MEETING

WILL BE HELD AT

ASKERN,

For the investigation of the neighbourhood of

CAMPSALL, SHIRLEY POOL AND JUNGLE, OWSTON, BURGHWALLIS, ASKERN, etc.

On THURSDAY, 15th JUNE, 1893.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Askern (L. & Y.), Moss (N.E.), or Kirk Smeaton (H. & B. line), to Members and Associates of the Y.N.U., producing their signed card of membership. Moss station is one mile E. of Askern, Kirk Smeaton station two miles N.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to Askern, Moss, or Kirk Smeaton; the reduction of fare will be granted for both portions of the journey.

Members in other counties wishing to attend should inform the Secretaries thereof, in order that railway facilities may be obtained for them.

ROUTES.—All parties will leave Askern Station at 10-30 a.m.

I.—Askern to Thorpe brick-pond, returning by way of Shirley pool and jungle, Haywood and Wrang Car drains, and Askern pool. *Leaders*, Rev. F. H. Allen and Mr. M. H. Stiles.

II.—To Campsall Woods, under the guidance of Messrs. J. M. Kirk and Geo. Winter. Mr. F. Bacon Frank hopes to meet this party.

III.—To Burghwallis and Owston Woods, and the pond in Four-acre Glebe Field. *Leader*, Mr. H. H. Corbett, M.R.C.S.

Permission to visit their estates is granted by Messrs. F. Bacon Frank, of Campsall Hall; G. B. C. Yarborough, Camps Mount; Percy S. Neville, Shelbrook Park; and G. Charlesworth, Skellow Grange.

BOOKS AND MAPS.—The country for investigation is in Sheets 87 N.E. and 87 S.E., 1-inch Ordnance Map (both can be had geologically coloured). Lankester's 'Account of Askern and its Mineral Springs' (1842), contains a sketch of its geology (pp. 34—50, with coloured map), botany (pp. 50—57), and zoology (pp. 54—72). It is surprising to find how little has been since done at so popular a resort, and Lankester's work is in part the basis of this circular. What later information there appears to be is at pp. 212, 220, 374 of Davis and Lees' 'West Yorkshire,' also in Lees' 'Flora of West Yorkshire.' Copies of the circular of the meeting held at Askern May 20th, 1886, may still be had from the Secretaries, price 3d., and full details of the observations then made will be found in the 'Naturalist' for 1886, pp. 189, 190, 212, 213, 279.

GEOLOGY.—The section will be officially represented by one of its Secretaries, Mr. J. W. Stather, F.G.S.

Mr. J. W. Davis, F.S.A., etc., writes as follows:—Askern is situated at the eastern extremity of the Upper Magnesian Limestone. At the railway station, and for a short distance towards the town, the limestone is hidden beneath alluvial deposits of laminated clays and warps. Beyond the town the ground rises considerably towards Campsall. The Upper Magnesian Limestone extends about 1½ miles to the western extremity of Campsall; it rests upon the Middle Red Marls exposed on Campsall Common and round Campsall Mount; these are superimposed on the Lower Magnesian Limestone which occupies the surface beneath Barnsdale. The Lower Limestone is exposed in several quarries, often near the roadside. It varies considerably in its character from a flaggy limestone, with thin beds of coloured marls, to thick irregular beds of yellow limestone, which are soft as a rule, but are occasionally hard and crystalline. A number of fossil mollusca have been found in the quarries further south, but in this neighbourhood fossils are either absent or have not been recorded.

The Middle Marls are not often exposed except in water courses, but their presence is generally indicated, when not too thickly covered with drift, by the red and wet soil and the springs thrown out at their junction with the limestone above. They consist of red and variously coloured marls, with occasional sandstones and beds of gypsum. The Upper Limestone may be seen in a quarry half-a-mile north of Askern; it is thinly bedded, hard, flaggy, and of a grey or yellowish colour. It is fossiliferous, containing *Axinus dubius* Sch. and *Myallina hausmannii* Goldf.

Near Askern to the S.W. a large section is exposed of Estuarine beds. The boulders forming these have probably been derived from glacial clays during a submergence of the land. The beds exposed are about sixty feet thick. At the base is a bed of sandy clay, above this is a bed of nearly pure sand, and then a considerable thickness of more or less rounded gravel, mainly derived from the rocks in the neighbourhood. The mass is current bedded, and sand, pebbles, and larger boulders are intermingled without any arrangement.

The flat lands of Askern Common are to a large extent marshy and contain numerous peat beds, full of stumps of trees amongst which have been found antlers of red deer; remains of lacustrine origin are plentiful. In the fields a little eastward of the town the ground two or three inches below the surface is composed of the mud of an old lake, which contains innumerable shells of land and freshwater mollusca of the genera Limnæa, Planorbis, Bythinia, Valvata, Zua, Helix, etc.

BOTANY.—The Botanical Section will be officially represented by Mr. P. F. Lee, President; and Mr. A. H. Pawson, and Mr. Charles Crossland, two of the Secretaries of the Section.

Mr. P. F. Lee reports as follows:—At the former visit to Askern, about a month earlier in the year than the present one, the flooded country prevented much work being done by this Section. The typical flora of Askern favours the ditches and watery places, and is only at the apex of its normal development in autumn, but should the weather be favourable this time, after the glorious spring and long succession of sunny days, the botanists may be quite certain of making good bags.

It will be of interest to cite, as at the former visit, some of the rarer plants mentioned by Dr. Lankester in his 1842 list, with the view of confirming or correcting his observations. Therefore his records are arranged by routes, marking by * some of those species mentioned by Lees at p. 374 of 'West Yorkshire.'

ROUTE I.—At Shirley Pool—**Typha angustifolia* and *Ranunculus lingua* (rare); in Sutton field—*Calamintha officinalis*; in Woods near Sutton Common—*Thalictrum minus*; Meadows between Sutton and Campsall—**Ophrys apifera* and **Colchicum autumnale*; Askern Pool—*Utricularia minor* and great profusion of *Chara hispida*; Askern Bogs—**Parnassia palustris* and *Anagallis tenella* (both rare); Meadows near Askern—*Rhinanthus major*; Askern Lanes—*Hyoscyamus niger*; between Askern and Moss—*Galeopsis versicolor* and *Viola lactea*; Ditches near Norton—*Helosciadium repens*; roadsides, etc.—*Dipsacus fullonum*, **Sison amomum*, **Viscum album*, *Campanula glomerata*, *Galeopsis ladanum*, *Acinos vulgaris*, and **Hottonia palustris*.

ROUTE II.—At Campsall—*Cerastium arvense*, *Œnanthe pimpinelloides* (these two at Askern also), *Ribes rubrum*, *Pastinaca sativa*, and **Carex stricta*; in Campsall Park—**Saxifraga tridactylites*, *Silene noctiflora*, **Astragalus glycyphyllos*, **Viburnum lantana*, *Lactuca virosa*, *Muscari racemosum*, and *Brachypodium pinnatum*; in Campsall Fish-pond—*Salix aquatica*; in Campsall Woods—**Rhamnus catharticus* and *Salix cinerea*; in Campsall Ditches—*Lemna gibba* and *L. polyrrhiza*; Cornfields near Campsall—**Bupleurum rotundifolium* and **Linaria elatine*; on the roots of beeches in Camps Mount and Campsall Parks—*Monotropa hypopitys*; in Camps Mount Park—**Geranium pyrenaicum* (rare), **Bromus erectus* and *B. racemosus*: in woods near Camps Mount—*Ribes alpinum*; and on the road from Askern to Barnsdale—*Calamintha nepeta*.

At p. 374 of 'West Yorkshire' (pub. 1878) the author queries *Dipsacus pilosus* for this district, but in August, 1880, I found the small Teasel in fine condition on a moist hedge-bank by the roadside, between Askern and Little Smeaton, and on the same date, in Askern, a fair amount of *Juncus obtusiflorus*, in the water-logged portion of a meadow.

Mosses and Hepatics.—Mr. M. B. Slater, F.L.S., reports that his list, at p. 212 of 'The Naturalist,' 1886, contains all that is hitherto known. He recommends bryologists at this season to search specially for the cortical species, as the species of *Orthotrichum*, *Barbula*, etc., should be in good condition on the trunks and bases of trees in shady places. The north sides of limestone walls, disused quarries, etc., will yield various species. Particular attention should be paid to the flat lands of Askern Common—flooded and unexaminable at the previous visit—where species of *Sphagnum* should occur, as well as some species of *Aulacomnium*, *Bryum*, *Webera*, *Philonotis*, *Hypnum*, etc., and various Hepatics.

Lichens, Algæ, and Fungi.—*Morchella esculenta* and *Pluteus chrysophæus* are the only fungi on record. No lichens are specified, and the algæ are mentioned under Micro-Zoology and Botany.

ENTOMOLOGY.—The Entomological Section will be officially represented by Mr. H. H. Corbett, M.R.C.S.

Though very little is actually known of the insects of the district, its old woods are likely to be fairly productive, and the ditches and ponds which abound in the low country are rich in aquatic insects of all orders, and will well repay investigation.

MICRO-ZOOLOGY AND BOTANY.—Mr. M. H. Stiles states that the district to be explored offers a very excellent field for investigation and hopes that on the present occasion substantial work may be done.

The following list is drawn up from records furnished by the Rev. F. H. Allen and Messrs. Barwell Turner, J. M. Kirk, and M. H. Stiles. For further particulars, including a list of the gathering grounds, the collector is referred to the 1886 Askern circular.

Volvocineæ: *Volvox globator*,

Desmidiaceæ: *Cosmarium crenatum*, *C. pyramidatum*, *C. margaritiferum*, *Closterium lunula*, *C. acerosum*, *C. eboracense*, *C. lineatum*, *C. costatum*, *Pediastrum boryanum*.

Diatomaceæ : *Frustulia saxonica, Diadesmis confervacea, Diatoma vulgare, Nitzschia sigmoidea, Cymatopleura solea, C. elliptica, Cocconema lanceolatum, C. cistula, Fragilaria capucina, Gomphonema acuminatum, Synedra radians, Meridion circulare, Pleurosigma attenuatum, Cocconeis placentula, Pinnularia radiosa* (?), *P. viridis, P. oblonga, Asterionella formosa, Navicula amphisbæna* (?), *N. cuspidata, Himantidium sp., Cymbella sp., Cyclotella kutzingiana.*

Rhizopoda : *Amæba diffluens, Actinophrys sol, Arcella vulgaris, A. aculeata, Difflugia sp.*

Infusoria : *Aspidisca lynceus, Coleps hirtus. Icthydium podura, Kerona mytilus, Phialina viridis, Stylonichia histrio, Urostyla grandis, Uvella virescens, Vorticella nebulifera, Amphilephus fasciolus, Dileptus folium, Himantophorus charon, Loxodes bursaria, Paramœcium aurelia, Stentor mulleri, Trachelocerca viridis, Dinobryon sertularia, Trachelius lamella, Chætonotus sp., Euglena pyrum, E. viridis, Chilodon cucullus.*

Hydra : *Hydra viridis, H. vulgaris.*

Polyzoa : *Plumatella repens.*

Entomostraca : *Branchipus stagnalis* (?), *Canthocamptus minutus, Cyclops quadricornis, Daphnia pulex, Diaptomus castor.*

Arachmida : *Milnesium tardigrada.*

CONCHOLOGY.—The Conchological Section will be represented officially by its Secretaries, Mr. F. W. Fierke and Mr. W. Nelson.

Mr. William Nelson writes that a few years ago Askern and its immediate neighbourhood was a favourite collecting ground of the Yorkshire conchologists, and as a result many local species, varieties and abnormal forms were found, amongst which may be mentioned white varieties of *Limnæa peregra, L. palustris, Helix caperata,* and *Clausilia rugosa.* A sinistral example of *Helix virgata* occurred to the late Mr. Lister Peace. Amongst normally formed shells may be mentioned *Helix fusca,* whilst *Bythinia leachii* abounds in some of the ditches. The flat lands of Askern Common mentioned in the geological paragraph is a prolific hunting ground, and numerous species may be obtained by carefully examining the mole heaps. In addition to the genera mentioned before, *Viviparus contectus* (now extinct in the district), *Vertigo antivertigo, Carychium minimum,* etc., have been found and no doubt others will reward the careful searcher.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by Mr. John Gerrard, M.B.O.U., its President, and Mr. Riley Fortune, F.Z.S., one of its Secretaries.

Somewhat detailed particulars of the mammals, birds, reptiles, and fishes, based upon the observations of Dr. Lankester, Mr. Neville Wood, and Mr. Mellor, were given in the 1886 circular, and it will be unnecessary to repeat them here.

Numerous birds frequent the woods, including the Nightingale (Owston), Hawfinch, Green and Great Spotted Woodpeckers, Reed and Grasshopper Warblers, Wood Warbler, etc., while the Crested and Little Grebes are on record for the district and should be looked for.

Of fishes, the most plentiful are the Rudd or Red-eye, Roach, Dace, Bream, Perch, and 3-spined and 10-spined Sticklebacks. The Ringed Snake, Lizard, and Blindworm should be looked for on the limestone, and the small mammals deserve investigation.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each, at the Swan Hotel, Askern.
4-45 p.m.—Sectional Meetings } If fine on the Bowling Green, otherwise in the
5-15 p.m.—General Meeting } Large Room attached to the Swan Hotel, Askern.

Yorkshire Naturalists' Union.

President:

HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds.

Hon. Assistant Secretary:

WALTER FRANCIS BAKER, 18, Hyde Terrace, Leeds.

THE HUNDRED-AND-FOURTH MEETING

WILL BE HELD AT

KIRKBY MOORSIDE,

For the investigation of the neighbourhood of

DOUTHWAITE DALE, SLEIGHTHOLME DALE,
and KIRKDALE,

On MONDAY, JULY 10th, 1893.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham Stations on the G.N., H. and B., L. and Y., L. and N. W., M. S. and L., Midland, and N. E. Railways which have booking arrangements for Kirkby Moorside to Members and Associates of the Y.N.U. producing their signed card of membership.

Those wishing to spend the week-end may book on Friday or Saturday, tickets being available for return on Monday or Tuesday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to Kirkby Moorside; the reduction of fare will be granted for both portions of the journey.

Members in other counties wishing to attend should inform the Secretaries thereof, in order that the railway facilities may be obtained for them.

HOTEL ACCOMMODATION.—Members intending to stay over the week-end will find accommodation at the 'King's Head,' Kirkby Moorside.

ROUTES.—All parties leave Kirkby Moorside Station at 10 a.m.

I.—Leave Kirkby by the church and pass over the hills to Yoadwath, then continuing northward in the direction of Gillamoor regain the table land at the top of the wood, and return by the Parks farms. Leader, Mr. Geo. Frank.

II.—Kirkdale, up Skiplam to Sleightholme Dale, returning by Fadmoor and Robin Hood Howl. Leader, Mr. W. B. Havelock.

III.—Geologists are recommended to leave Kirkby on the north side and proceed by Manor Vale, then cross over the country by the Gillamoor road past the Hagg Farm to Kirkdale Valley, emerging on the south at Kirkdale Church and Cave, and back to Kirkby.

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

BOOKS AND MAPS.—The district for investigation is included in Sheets 43 and 53 (96 N.E. and S.E. of old series) of the One-Inch Ordnance Survey, which may be had geologically coloured. The geology is described in the 'Memoir of the Geological Survey.' Members can also refer to Baker's 'North Yorkshire,' and to Mr. George Frank's 'Guide to Ryedale,' which contains much useful information about this district. Buckland's 'Reliquiæ Diluvianæ' gives full information concerning Kirkdale Cave.

GEOLOGICAL MAPS AND BOOKS MISSING.—The Minute Book of the Geological Section for 1892 is missing, and also several geological maps used at various excursions of late years. The Hon. Librarian (Mr. Leonard Hawkesworth, 49, Fenton Street, Leeds) would be glad if members who may happen to have any of them in their possession would at once return them to him.

GEOLOGY.—The section will be officially represented by its secretaries, Mr. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

Mr. W. Lower Carter, M.A., F.G.S., writes that Kirkby Moorside is situated in the midst of some of the most characteristic scenery of the famous Vale of Pickering, which is a roughly oval area almost entirely covered with alluvial deposits and post-glacial sands and gravels. This oval is elongated in an east and west direction, and is bounded on the north, west, and south-west by Oolitic hills, and on the south-east by the Chalk Wolds. The remarkable course of the Derwent —which, rising near the coast, flows westward instead of taking the valleys to the east—is a well-known instance of erratic river flow, and points to an extension of high land much further to the eastward in the early period of the formation of this vale. The whole of the drainage of this oval area is carried away by the Derwent through the gorge at Malton, and in the opinion of many observers this basin was once a lake or great sea-loch.

On either side of Kirkby Moorside a long sinuous valley runs northwards cutting deep grooves into the table-like hills and exposing interesting sections of the Middle and Lower Oolitic beds, which dip gently to the south and are exposed in order as we pass northwards. The Lower Oolites, which in this area consist of a gaeat series of estuarine, marine, and freshwater beds, divided into three series, 'each of which is capped by a thin but well-marked band full of marine fossils' (Fox-Strangways), are exposed at the northern extremities of these valleys, but in their lower reaches the beds seen are confined to the Middle Oolites. It is to these that the attention of the geological section will be principally directed. Immediately above the dark shales of the Cornbrash (the topmost bed of the Lower Oolites) comes the Kellaways rock, which in this area is a 'thick-bedded soft sandstone, usually rather ferruginous.' 'In its upper portion there is a red calcareous band from which most of the fossils are obtained, the rest of the formation being entirely unfossiliferous.' This band contains several species of Ammonites and many bivalves. The Oxford clay in this area is a grey sandy shale 'lithologically very unlike its equivalent in the south of England.' Its fossils are few in number and badly preserved.

The Lower Calcareous Grit is 'a massive, yellow, calcareous sandstone, becoming more shaly towards its lower portion.' Above this come the Passage Beds with the 'Greystone,' a hard siliceous rock much false-bedded.

The capping rock of a great part of the tabular hill above Kirkby is the Coralline Oolite, a massive thick-bedded limestone 'composed of minute oolitic grains with a great number of fossils.' This limestone is divided into two principal beds, separated by a thin set of sandstones known as the Middle Calcareous Grit. Kirkby Moorside itself stands on the Upper Calcareous Grit, whilst the rising ground immediately above the town to east, west, and south, is capped by blue Kimeridge Clay. This clay is supposed to underly the greater part of the post-glacial deposits of the Vale of Pickering, but it is only revealed in occasional patches in the central area.

Patches of boulder clay occur in the neighbourhood of Kirkby, one of which is cut through by the North Eastern Railway near Kirkby Mills.

In the Coralline Oolite of this area there are many caves, one of which—the Cave of Kirkdale—is celebrated by the researches of Buckland. This cave, which is situated at the entrance to Kirkdale, contained an extensive accumulation of bony remains covered by a deposit of mud, the whole overlaid by stalagmite. No human remains or traces of human workmanship have been found in this cave, nor is there evidence of more than one period of occupation by predaceous beasts (Phillips). The cave would appear to have been a hyæna den, most of the bones being well gnawed, and the proportion of hyæna remains being exceptionally large.

BOTANY.—The Botanical Section will be officially represented by Mr. Albert H. Pawson and Mr. M. B. Slater, two of its secretaries.

Mr. Allan B. Hall reports that but very little appears to be known definitely of the botany of this district. *Daphne laureola* grows in a field near the Cricket Ground. By the road-side near the mill in Douthwaite Dale is a large patch of *Atropa belladonna*, and the following plants have been found in Douthwaite Dale, between the mill and Grouse Hall: *Habenaria bifolia*, *Narcissus pseudo-narcissus*, *Trollius europæus*, *Myrrhis odorata*, *Carex hirta*, *C. pendula*, and *C. paniculata*. Near Gillamoor the following are found: *Antennaria dioica*, *Genista anglica*, *Ranunculus hederaceus*, and *Geum intermedium*. Several of the rare orchids, fly, bee, etc., grow around here and may reward the searcher, though the season is rather late for the flowers.

Mr. M. B. Slater, F.L.S., considers that the fine woodlands of Kirkdale and Sleightholme Dale should be good ground for the botanist. In Kirkdale the rare plants *Gagea lutea* and *Lathræa squamaria* grow; both, however, flower in the early spring. *Myrrhis odorata* and *Lamium galeobdolon* grow along the stream-side. At this season Grasses are in their finest condition, and species of the woodland and meadow kinds in the genera *Poa*, *Festuca*, *Phleum*, *Alopecurus*, *Holcus*, *Avena*, *Aira*, *Bromus*, *Brachypodium*, etc., may be gathered by members interested in the study of the British grasses.

Mosses.—*Gymnostomum tenue* and *Fissidens pusillus* grow on wet stones in shady places, and some of the summer fruiting species of *Bryum*, *Mnium*, *Dicranum*, *Barbula*, *Hypnum*, etc., should be looked for in similar places. On trees in damp shady places species of *Orthotrichum*, *Ulota*, *Barbula*, and other cortical growing kinds are most likely to be found.

Hepatics.—Species of *Radula*, *Lophocolea*, *Frullania*, *Metzgeria*, etc., grow on trees, and on wet stones and in damp shady places by the stream-side species of *Scapania*, *Plagiochila*, *Chiloscyphus*, *Jungermania*, etc., may be gathered.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by Mr. Riley Fortune, F.Z.S., one of its secretaries.

Although there appear to be no published records for this section, the country with its greatly diversified scenery looks remarkably promising. Mr. H. Slater states that he himself saw a pair of Badgers there last year, and the Otter appears to be fairly common in the rivers, whilst the birds of prey appear to be well represented, but scarcely any attention appears to have been paid to the small mammals.

Mr. John Braim reports that the following have also been found there: Pine Marten, Weasel, Ermine, Buzzard, Tawny, Barn, Long and Short-eared Owls, Jay, Green and Large Spotted Woodpeckers, Spotted and Pied Flycatchers, Nuthatch, Tree Creeper, and Nightjar.

Mr. J. W. Wheldon has obtained the following in the district: Trout, Minnow, Eel, Loach, Miller's Thumb, Grayling, Pike, Chub, and Dace.

CONCHOLOGY.—The Conchological Section will be officially represented by Mr. F. W. Fierke, M.C.S., one of its secretaries.

There appear to be absolutely no records at all for this section and consequently a fine field is open for any conchologist.

ENTOMOLOGY.—The Entomological Section will be officially represented by its president, Mr. James H. Rowntree, and Mr. A. E. Hall, F.E.S., one of its secretaries.

Very little indeed appears to be known of the entomology of the district and there seem to be no authentic records for any of its branches. The district appears to be a very promising one for lepidoptera, but the only species on actual record is *Diloba cœruleocephala*, a larva of which was seen at Kirkby Moorside Station this season.

It would be difficult indeed to find a district which augured better for the coleopterist than this one and some good records should be made, though at present practically nothing is on record. As the Glow-worm is found in abundance in the hedge-rows near Helmsley, about six miles off, it should also be found here, and the great quantity of trees growing in the neighbourhood should furnish many of our wood-borers. *Sirex gigas* appears to be common in the district.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each
4.45 p.m.—Sectional Meetings
5- 0 p.m.—General Meeting

} At the 'King's Head,' Kirkby Moorside. If fine in the garden, otherwise in the large room at the 'King's Head.'

5-41 p.m.—Train departs for York.
6-47 p.m.—Train departs for Pickering.

The next Meeting will be on Bank-Holiday Monday, August 7th, at Sawley Abbey.

Yorkshire Naturalists' Union.

President:

HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds,

Hon. Assistant Secretary:

WALTER FRANCIS BAKER, 18, Hyde Terrace, Leeds.

THE HUNDRED-AND-FIFTH MEETING

WILL BE HELD AT

HELLIFIELD,

For the investigation of

THE VALLEY OF THE RIBBLE

from GISBURN to

SAWLEY ABBEY,

ON

Bank-Holiday Monday, Aug. 7, 1893.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham Stations on the G.N., H. and B., L. and Y., L. and N. W., M. S. and L., Midland, and N. E. Railways which have booking arrangements for Gisburn or Chatburn to Members and Associates of the Y.N.U. producing their signed card of membership.

Those wishing to spend the week-end may book on Friday or Saturday, tickets being available for return on Monday or Tuesday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to their destination. The reduction of fare will be granted for both portions of the journey.

Members in other counties wishing to attend should inform the Secretaries thereof, in order that the railway facilities may be obtained for them.

THE DISTRICT for investigation consists of the narrow gorge through which the Ribble flows from Gisburn to the Lancashire border at Smithies Bridge, together with the Parks of Gisburn and Bolton-by-Bowland, and the neighbouring grass-lands on both banks of the river.

HOTEL ACCOMMODATION.—Members intending to stay over the week-end will find accommodation at the 'Spread Eagle' at Sawley, the 'White Bull' at Gisburn, or the 'Black Horse' at Hellifield.

ROUTES.—

I.—Geologists should leave Chatburn at 11-35 a.m. and proceed to Gisburn. Leader Mr. R. H. Tiddeman, M.A., F.G.S.

II.—Leave Chatburn Station at 11-35 a.m. to investigate the immediate vicinity of Sawley Abbey, returning to Chatburn in time for the 5-3 p.m. train.

III.—Members desirous of investigating Gisburn Park and the adjacent woods, should alight at Gisburn Station at 11-23 a.m., returning therefrom at 5-16 p.m.

Permission to visit their estates is kindly granted by Lord Ribblesdale, the Dowager Countess Cowper, and Mr. C. B. E. Wright.

BOOKS and MAPS.—The whole of the district for investigation is included in sheet 92 S.W. one-inch ordnance map, also published geologically coloured. The new edition of the Geological Survey Maps, 92 N.W. and 92 S.W., may now be had through the agent, E. Stanford, Charing Cross, London. Whitaker's 'History of Craven' should be referred to, especially for an account (with figures) of the herd of Wild White Cattle which formerly existed at Gisburn. The 'Naturalist' for 1881, and Davis and Lees' 'West Yorkshire' should also be consulted.

GEOLOGY.—The section will be officially represented by its president, Mr. R. H. Tiddeman, M.A., F.G.S., and one of its secretaries, Mr. W. Lower Carter, M.A., F.G.S.

Mr. R. H. Tiddeman, of H.M. Geological Survey, writes:—The Geology is represented in Geol. Survey Map, Sheet 92 S.W., and the Memoir on the Burnley Coalfield. The route from Gisburn to Sawley along the Ribble is in a gorge which has been excavated by the river and gives beautiful views of river scenery. The geology is not of first-rate interest as the river runs nearly along the strike upon beds above and below the upper boundary of the Clitheroe Limestone (Carboniferous). The Limestone is on the chief anticline of North Lancashire and strikes in a N.E. direction from near Chorley to Bolton Abbey. Some of the lowest beds, probably, of this anticline are cut through by the railway between Gisburn and Rimington to the east of the Ribble. Here they consist more of shales than limestones. The main mass of the limestone is cut off by a N.N.E. fault which ranges by Wybersey Hill, Bolton Hall, and the Archery Ground where it crosses the Ribble. Some interesting examples of flexure and one of overthrust of the beds were to be seen in a quarry east of Sawley Abbey near the Gisburn road. Sawley Abbey is an interesting early example of jerry-building, its walls being of shale in spite of better stone abounding in the neighbourhood. If time should permit portions of the other side of the anticline may be seen about Downham or Chatburn where the beds are better exposed.

BOTANY.—The Botanical Section will be officially represented by Mr. Chas. Crossland. Mr. C. B. E. Wright, of Bolton Hall, has kindly consented to show his gardens, etc., which will amply repay a visit. Bolton Hall itself is an ancient mansion of well-known historic interest.

Although definite local information appears to be difficult to obtain, yet, from the varying nature of the district—its hills and dales, marshy tracts and old woods—it should be an extremely rich district for the botanist. There does not appear to be any available information of later date than that of Davis and Lees' 'West Yorkshire,' published in 1878, wherein we read as follows:—In the lower and less rocky part of the Ribble Valley fewer botanical treasures are naturally to be had for the gathering than in the upper [or Settle] half of its Yorkshire course. But about Gisburn and Sawley, where are the remains of an old abbey, under the frowning crest of Pendle Hill, in several rocky dells and cloughs, grows *Impatiens noli-me-tangere*, native in all seeming; for it is not confined to one or two stations in the vicinity of dwellings, and occurs also over a wide area in the adjacent part of Lancashire, about Huntroyd and Sabden. If it be, indeed, an introduced species, it is difficult to explain why it should occur so much more frequently hereabouts than in other parts of Yorkshire, where it is quite as commonly grown in cottage

gardens, and is in its (few) stations obviously an escape. The following are the more noteworthy species of the Ribble plain, upon the river banks and adjacent pasture and bog-land from Settle, Long Preston, and Wigglesworth to Bolton-by-Bowland and Sawley :—

Thalictrum flexuosum
Cardamine amara
Stellaria nemorum
Hypericum androsæmum
H. dubium
Geranium sylvaticum
G. lucidum
Impatiens noli-me-tangere
Alchemilla montana
Sanguisorba officinalis
Rubus leucostachys
R. lindleianus
R. salteri
R. rosaceus
Rosa subcristata
R. dumetorum
Myriophyllum spicatum
Hippuris vulgaris
Sedum villosum
Pimpinella magna
Sium angustifolium
Myrrhis odorata
Pulicaria dysenterica
Eupatorium cannabinum
Hieracium murorum
H. sylvaticum
H. umbellatum
Mentha rubra
M. sativa
Symphytum tuberosum
Rumex aquaticus
Salix helix (rubra)
S. rugosa
S. nigricans
S. phillyreifolia
(S. laurina)
Potamogeton densus
Allium oleraceum
Scirpus sylvaticus
Schœnus nigricans
Scirpus pauciflorus
Avena pratensis
Equisetum sylvaticum

Mosses.

Tortula intermedia
Hypnum rugosum
Hypnum molluscum
H. crista-castrensis

VERTEBRATE ZOOLOGY.—A feature of interest connected with Gisburn Park, is that in it was kept the last herd of Wild White Cattle in Yorkshire, the last survivor of which was killed in 1859, the breed having become degenerate with continuous breeding 'in-and-in.'

Ornithological information seems to be altogether wanting for this district, except that in 1881 the Pied Flycatcher was observed at Gisburn by Mr. W. Eagle Clarke.

In 1881 notes on the **Mammals, Reptiles,** and **Fishes** of the Gisburn Estate were furnished to the authors of the 'Hand-Book of Yorkshire Vertebrata,' by Mr. John Twiss, game-keeper to Lord Ribblesdale : the Hedgehog, Mole, Stoat, Weasel, Squirrel, Hare, Rabbit, and Rats and Mice were described as abundant, while the Otter breeds and is destructive to fish, and the Fox appears to be almost non-existent. Of **Reptiles** the Viper and Slow-Worm occur ; and of **Fish** there are a few Gudgeon, Dace, and Roach, a great quantity of Minnows, Eels, and Chub, and a few Pike, while Salmon and Trout are numerous.

CONCHOLOGY.—Mr. W. Denison Roebuck, F.L.S. states that the gorge through which the Ribble flows from Gisburn to Sawley Abbey and thence to the county boundary at Smithies Bridge near Chatburn, is very productive in land mollusca, from its well-wooded character and the predominance of calcareous matter in the soil. The species hitherto observed are : *Arion ater*, *A. hortensis*, *A. subfuscus*, *A. minimus*, and *A. circumscriptus*, *Limax marginatus* (*arborum*), and *Agriolimax agrestis*, *Hyalinia cellaria*, *H. glabra*, *H. nitidula*, *H. crystallina*, *Helix rotundata*, *H. aspersa* (Sawley Abbey ruins), *H. nemoralis*, *H. hortensis*, *H. arbustorum*, *H. rufescens*, *H. hispida*, *H. granulata* (*sericea*), *H. caperata* (Gisburn), *Bulimus obscurus* (Sawley), *Pupa cylindracea*, *Clausilia perversa*, *Cl. laminata*, *Azeca*, *Cochlicopa lubrica*, *Succinea putris* (Gisburn), and

Carychium—in all twenty-nine species, to which, obviously, several more should be added as a result of more careful search than has hitherto been bestowed on the district. In addition to these, a pond (or rather old channel of the river) at Gisburn, produced on the occasion of the Union's visit to Gisburn in April 1881, the following freshwater species, several of them in abundance: *Sphærium corneum*, *Bithinia tentaculata*, *Valvata piscinalis*, *Limnæa peregra*, *L. palustris*, *L. truncatula*, *Planorbis contortus*, *Pl. vortex*, *Physa fontinalis*, and *Ancylus fluviatilis*—ten species, a rather remarkable number for so upland a district. The old channels of the river, both at Gisburn and at Sawley, should be carefully searched, as well as the woods on both banks of the Ribble.

ENTOMOLOGY.—Probably no district which the Union has visited lately holds out such a fair prospect as this one does for the entomologist. The rich pasture lands—both in the neighbourhood of Sawley and along the river banks—are the feeding ground of quantities of cattle and the coleopterist who desires to work up the Scarabæidæ will have a splendid chance; and there are several good ponds, both at Sawley and Gisburn, which will certainly repay a careful search. The river banks are well-wooded, and there are plenty of old stumps and dead trees about which should yield abundance of 'wood-borers,' and the shady glades in the woods along the bank side hold out great promise for the lepidopterist. *Dianoïs cœrulescens* and several other species of Staphylinidæ are common in the moss on the stones, in the rapid little brooks which run down the gorge side to join the river, and it is quite possible that *Henicocerus* may be found there. In a wood (about two miles from Sawley and three from Gisburn) on the bank of the Ribble are the ruins of an old cottage and the loose stones and beams lying around should prove a 'happy hunting ground' for the coleopterist searching for Geodephaga and Staphylinidæ. Three species of Grasshoppers have been found on the hill-sides near to Gisburn, and there are some very good ponds there which should not be missed, if time will allow an examination.

PROGRAMME OF MEETINGS.—

All parties will return by the train leaving Chatburn at 5-3 p.m., and Gisburn at 5-16 p.m., arriving at Hellifield at 5-28 p.m.

5-30 p.m.—Meat Tea, 2/- each
6-15 p.m.—Sectional Meetings
6-30 p.m.—General Meeting

} All at the Black Horse Hotel, Hellifield.

Train leaves Hellifield for Skipton and the south at 7-35 p.m.

The next meeting of the Union will be at Howden, for a Fungus Foray, on Wednesday and Thursday, September 6th and 7th, 1893.

Will Members favour the Secretaries with notes or references to information for the circular?

Yorkshire Naturalists' Union.

President:

HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
REV. E. P. KNUBLEY, M.A., Staveley Rectory, Leeds,

Hon. Assistant Secretary:

WALTER FRANCIS BAKER, 18, Hyde Terrace, Leeds.

THE HUNDRED-AND-SIXTH MEETING

WILL BE HELD AT

POCKLINGTON,

For the investigation of the neighbourhood of

BARMBY, ALLERTHORPE, KILDWICK PERCY and WARTER,

On THURSDAY, SEPT. 7th, 1893,

And will be preceded by a

FUNGUS FORAY

On WEDNESDAY, Sept. 6th, 1893.

☞ This Excursion is planned for two days, of which the principal one will be the second. Members not able to attend both days, and able to choose, are requested to attend on the Thursday.

This Meeting was originally intended to be held at Howden, but the place being found quite unsuitable for a Fungus Foray, it is considered advisable to reserve it for an excursion on some future occasion.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham Stations on the G.N., H. and B., L. and Y., L. and N. W., M. S. and L., Midland, and N. E. Railways which have booking arrangements for Pocklington, with permission to break their journey at Londesborough or Nunburnholme, to Members and Associates of the Y.N.U. producing their signed card of membership. Members wishing to stay the whole excursion may book on Tuesday to return on Friday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to Pocklington; the reduction of fare will be granted for both portions of the journey.

Members in other counties wishing to attend should inform the Secretaries thereof, in order that the railway facilities may be obtained for them.

HOTEL ACCOMMODATION.—Members intending to stay the two days will find accommodation at the Feathers Hotel, Pocklington.

Permission to visit their estates is kindly granted by Lord Londesborough, Lord Herries, Mr. Charles H. Wilson, M.P., and Major General Duncombe.

BOOKS AND MAPS.—The district for investigation is included in Sheets 93 S.E. and 94 S.W., one-inch Ordnance Map (also published geologically colored).

There is an account of the last Excursion of the Union to Pocklington in the 'Naturalist' for 1885, pp. 307—309.

MYCOLOGISTS are cordially invited to visit Yorkshire and join in the investigations. The following gentlemen have already intimated their intention of being present:—Mr. George Massee, of the Royal Herbarium, Kew; Mr. Carlton Rea, M.A., LL.B., of Worcester; Mr. H. T. Soppitt, of Bradford; Mr. Chas. Crossland, of Halifax; Mr. A. Clarke, of Huddersfield; Mr. J. W. Sutcliffe, of Halifax; and Mr. W. Norwood Cheesman, of Selby.

Mr. Massee will arrive on Monday night in readiness for a preliminary ramble on Tuesday. Members desirous of joining him on that day may ascertain particulars from the Secretaries.

WEDNESDAY'S PROGRAMME.—Leave Pocklington Station on the arrival of the 10-54 train, and proceed to Allerthorpe Common. Leader, Mr. W. Wox.

Meat Tea (2/- each) will be provided at the Feathers Hotel on returning, after which the evening will be devoted to the arrangement of the Show.

FUNGUS SHOW.—An Exhibition of Fungi, in the large room at the Feathers Hotel, will be arranged on Wednesday Evening. Parcels of Fungi from other parts of Yorkshire will be very acceptable if packed in boxes with moss or bracken (*not* in paper) and sent carriage paid so as to reach Pocklington not later than Wednesday noon; localities to be stated.

The Secretaries would be particularly glad to hear from members who intend to be present and are willing to assist in arranging the Show.

THURSDAY'S ROUTES.—

I.—Leave Pocklington Station at 10-54 for Allerthorpe Common and Thornton Plantations, returning by Manor Farm and fish pond to Pocklington.

II.—Leave Pocklington as above and proceed to Kildwick Percy.

III.—Geologists are advised to leave the train at Nunburnholme, proceed in the direction of Warter, passing through the grounds of the Priory, and working back through Kildwick to Pocklington.

Routes I. and II. will be under the guidance of Mr. W. Wox and Mr. G. Steels. The Mycologists will probably take Route II.

GEOLOGY.—This Section will be officially represented by Mr. J. W. Stather.

The Hon. Secretaries of the Geological Section, Messrs. W. L. Carter, F.G.S. and J. W. Stather, F.G.S., write as follows:—Pocklington is situated just outside the western fringe of the Chalk Wolds, the town itself being on the Keuper beds (Upper Trias) of the Vale of York. In the short distance of a three miles' walk the narrow outcrop of the Lower Lias beds is crossed, and suddenly we come upon Upper Cretaceous beds, the Upper Lias, the whole of the Oolites, and the Lower Cretaceous (Neocomian) being absent in this area. The amount of denudation which thus is shown to have taken place in the middle of the secondary period receives further corroboration from the fact that at a little distance to the north, both near Millington, and at Kirkby Underdale and Acklam, small patches of Oolitic deposits remain, relics of great masses of strata which once overlaid the whole district. Taking the beds likely to be seen during the excursion, in ascending order, we must mention

(1) The Keuper Marls, upon which Pocklington stands. In Grimthorpe wood, two miles to the north, a section is seen, and also at Owesthorp Mill, one mile to the north. There is also a good section in a brick-yard, close to the railway, about a mile from Pocklington.

(2) Lower Lias.—In East Yorkshire the Lias is everywhere conformable to the under-lying Keuper, and can be traced in a narrow strip along the edge of the Chalk escarpment. Search should be made for a representative of the Rhætic beds, intermediate between the Keuper and Lias, in any section examined. The Lias beds are characterized at certain horizons by a predominance of some particular species of Ammonite, forming a series of zones or bands which are easily identifiable by their special fossil contents. In tracing the stream up from Nunburnholme to Warter, the zone of *Ammonites planorbis* will be found, the oyster-beds being first seen, and afterwards the blue clays and marls of the same zone. The *Angulatus* zone is seen in quarries between Millington and Pocklington. The over-lying *bucklandi* and *jamesoni* zones are found in order as the valley is ascended towards Warter.

(3) UPPER CRETACEOUS.—On ascending the hill near Warter Priory, the Red Chalk, the lowest bed of the Upper Cretaceous, is observed to crop out. This bed extends in a long sinuous line from Speeton, along the north side of the Wolds to Acklam Brow, turns southwardly to Brough, and through Lincolnshire to Hunstanton in Norfolk, where it entirely disappears. The Red Chalk also crops out in the dales of the Wolds, wherever the overlying White Chalk has been cut through by denudation; it can also be traced by the springs which issue from its junction with the underlying clays, whether Lias, Oxford, Kimmeridge, or Neocomian. The deep red colour of this bed, in marked contrast to the White Chalk above, is due to the presence of oxide of iron, but the manner of its introduction is a matter of much speculation. In the Warter brickyard is seen the famous section mentioned by Messrs. Tate and Blake in their great work on the 'Yorkshire Lias.' Here, although somewhat obscured by slips, were seen *in situ* Grey and White Chalk, succeeded below by the Red Chalk and again beneath by Lower Lias beds of the zone of *Ammonites bucklandi*. Characteristic fossils of the Lower Lias, such as *Belemnites acutus* and *Gryphæa incurva* are here obtainable in abundance. The chalk beds in this area consist entirely of the lower and middle divisions, no upper Chalk being present.

(4) CHALK GRAVELS.—The surface deposits passed over will be chiefly post-glacial chalky gravels, which are found very extensively at the foot of the Wolds. Each of the winding valleys which intersects the chalk of this area has its bottom largely composed of a flat surface of these gravels, which consist entirely of chalk fragments and flints, the relics of ages of steady denudation. These gravels readily absorb water, and so the valleys are usually dry bedded.

BOTANY.—The Botanical Section will be officially represented by Mr. P. F. Lee, the President, and Messrs. M. B. Slater, F.L.S., and C. Crossland, Secretaries of the Section.

Mr. J. J. Marshall writes that:—The circular for the last meeting at Pocklington stated the flora of the district was unknown; very little work has since been done to place it on a more satisfactory footing. The lateness of the present fixture and the early flowering season will probably prevent a large number of phanerogams from coming under notice. During a recent visit to Allerthorpe Common and Barmby Moor the following characteristic sand and peat loving plants were secured, and some will reward the careful searcher:—*Gentiana pneumonanthe*, *Comarum palustre* (*fruit*), *Jasione montana*, *Drosera intermedia*, *Ornithopus perpusillus*, *Galium uliginosum*, *Salix repens*, *Radiola millegrana* and *Scleranthus annuus*. *Malva rotundifolia* is frequent by the side of old buildings in the villages near, and *Silene noctiflora*, *Sanguisorba officinalis*, *Carduus heterophyllus*, *Anagallis tenella*, *Lamium amplexicaule*, *Filago minima*, *Centunculus minimus*, *Rumex hydrolapathum*, and *Apera spica-venti* have all been noted on similar ground, within the radius of a few miles. Those who ascend the higher ground to Kildwick Percy, the adjacent portion of the Yorkshire Wolds, will probably meet with *Carduus nutans*, *Scabiosa columbaria* and *Spiræa filipendula*. The following mosses occur on the common:—*Dicranum palustre*, *Dicranum spurium*, *Dicranella cerviculata*, *Bryum erythrocarpum*, *Tortula convoluta*, and specimens of *Campylopus* should be found. The Northern lichen *Cetraria islandica* is abundant.

Mr. P. F. Lee writes:—The neighbourhood of Pocklington, with the sloping sides of the Western escarpment of the Wolds, ought to be fairly good botanical ground, but there appears to be very little information available, this part of the East Riding having been somewhat inadequately worked.

Out of about 160 observations made on June 24th, 1885 (in the district of Kildwick Percy and Warter), the following may be named, although none are plants of great rarity:—

Berberis vulgaris	*Origanum vulgare*
Viola hirta	*Cornus sanguinea*
Geum intermedium	*Carex hirta*
Geranium pratense	*Festuca elatior*
Poterium sanguisorba	*Equisetum maximum.*

It is to be hoped that, even at this period of the year, considerable additions may be registered, thus contributing authentic records towards a future East Riding Flora.

Mr. M. B. Slater, F.L.S., also sends the following notes:—For mosses and Hepaticæ, consult Dr. Parsons' list of East Riding Mosses, and Dr. Spruce's list of Hepaticæ, pub ished in the transactions of the Y.N.U., Series E, Botany, pages 51 to 63. *Cryphæa heteromalla* Hedw, a Southern moss, rare in the North of England is recorded for the East Riding; it fruits at this season and should be looked for on tree trunks in the Pocklington district.

Mr. Massee informs us that *Xerotus degener* Fr., one of the rarest of British fungi, is recorded from E. Yorks., in peat swamps. This doubtful record should be corroborated if possible.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by Mr. John Gerrard, M.B.O.U.

The neighbourhood of Pocklington, as planned for investigation on this occasion, will be found to be, from its varied physical characteristics, rich in forms of vertebrate life. On the one side the western escarpment of the Chalk Wolds thickly clothed in wood, and on the other the agricultural districts of the York plain, with the extensive unenclosed Allerthorpe Common and its encircling patches of woodland, all furnish haunts of varying character for birds and mammals, reptiles and amphibians, while not a few fish should be found in the canal.

Of **Mammals** the records include the Whiskered Bat, and of **Reptiles** the Common Lizard, the Common Snake, and the Viper in two forms.

In **ORNITHOLOGY** the district has been well investigated by Mr. G. Steels, of Pocklington, whose list includes amongst other species the following:—Waxwing, Mealy Redpoll, Greater and Lesser Spotted and Green Woodpeckers, Ring Ouzel, Snow Bunting, Little Grebe, Quail, Ringed Plover, Grey Phalarope, Redshank, Sandpiper, Wood Warbler, Redstart, Cole Tit, Grey Wagtail, Dipper, Pied Flycatcher, Corncrake, Bullfinch, Hawfinch, Siskin, Goldfinch, Brambling, Grasshopper Warbler, Nuthatch, Grey Shrike, Lesser Redpoll, Jay, Woodlark, Night Jar, Kingfisher, Turtle Dove, Water Rail, Coot, Snipe, Jack Snipe, Sanderling, Curlew, several Owls and Hawks, Crossbill, Heron, and numerous stragglers and commoner species.

CONCHOLOGY.—The Conchological Section will be officially represented by Mr. F. W. Fierke, one of the secretaries, and also Mr. T. Petch, B.A.

At the last visit of the Union to Pocklington, Mr. J. Darker Butterell reported that there had been found about Kildwick Percy and Pocklington six slugs, six water shells, and 13 land shells, making the total number 25. The slugs were—*Arion ater*, *A. hortensis*, *Limax agrestis*, *L. lævis*, *L. maximus*, and *L. flavus*; the water shells were—*Anodonta cygnea* (abundant in the lake at Kildwick Percy), *Pisidium pusillum*, *Planorbis albus*, *P. complanatus*, *Limnæa peregra*, and *L. truncatula*; and the land shells were—*Zonites nitidulus*, *Z. alliarius*, *Helix aspersa*, *H. nemoralis*, *H. hortensis*, *H. cantiana*, *H. hispida*, *H. rotundata*, *Bulimus obscurus*, *Clausilia rugosa*, *C. laminata*, *Zua lubrica*, and *Carychium minimum*. Whilst at Pocklington arranging for this excursion *Helix arbustorum* and *H. virgata* were also found.

ENTOMOLOGY.—The Entomological Section will be officially represented by Mr. Walter F. Baker.

Mr. Baker considers that the district is one which should prove most attractive to the entomologist, owing to the very diversified nature of the country, including as it does, wide expanses of gorse covered commons, large woods with plenty of open glades, and many ponds whose 'ancient and fish-like smell' augurs very favorably for aquatic insects. Whilst in the district arranging for the excursion ten species of butterflies, two species of moths, and forty-eight species of beetles were obtained, whilst dragon-flies were in the greatest abundance near the canal. Allerthorpe Common, in particular, is very good for the entomologists. Here *Geotrupes typhœus* occurs in abundance; *Melolontha vulgaris*, *Sermyla halensis*, *Adalia obliterata*, *Halyzia 22-punctata*, and *Coccinella 7-punctata* are very common, and one *C. hieroglyphica* was obtained. *Bolitobius trinotatus* and *B. exoletus* were found on decaying fungi, and, as this is a good spot for the mycologist, many other fungivorous beetles should be found.

PROGRAMME OF MEETINGS.—

3-45 p.m.—Meat Tea, 2/- each
4-15 p.m.—Sectional Meetings
4-30 p.m.—General Meeting

} At the Feathers Hotel, Pocklington.

Yorkshire Naturalists' Union.

President:

R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WALTER F. BAKER, F.E.S., Crossgates, Leeds.

THE HUNDRED-AND-EIGHTH MEETING

WILL BE HELD AT

SEDBERGH

For the investigation of the neighbourhood of

Dowbiggin, Lune Valley, and Uldale,

On WHIT-MONDAY, May 14th, 1894.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham stations on the G.N., H. & B., L. & Y., L. & N.W., M.S. & L., Midland, and N.E. Railways which have booking arrangements for Sedbergh, to Members and Associates of the Y.N.U. producing their signed card of Membership.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction and rebook to Sedbergh; the reduction of fare will be granted for both portions of the journey.

Members desirous of spending the week-end may book on Friday or Saturday; tickets being available for return on the following Monday or Tuesday.

HOTEL ACCOMMODATION.—Members will find accommodation at the 'Bull' and 'White Hart' Hotels, the Old Vicarage, Carradus Temperance Hotel, and others.

It is hoped that several members will take the opportunity of spending Sunday in Sedbergh, as the Rev. J. H. Mackie and Mr. Hugh Richardson invite the members to meet at the class-rooms, Sedbergh Schools, from 9 to 10 on Saturday night. There will be an exhibition of ordnance maps, microscopes, geological and botanical specimens. Lantern slides illustrating the scenery and geology of the district will be shown with the limelight, and a short account given of some of the walks in the neighbourhood.

Permission to visit their estates is kindly granted by Mrs. F. U. Cotterill-Dormer, Mr. W. P. Boustead, J.P., and Mr. Septimus Udale.

BOOKS AND MAPS.—The district for investigation lies chiefly in Sheet 39 (=98 N.E.) of the one-inch Ordnance Map. The Uldale and Garsdale routes stretch into 40 (=97 N.W.). Part of the Lune route lies just within 49 (=98 S.E.). These sheets may be had either hachured or contoured. They have also been published geologically coloured, and some of them with the surface geology. The 6-inch survey is remarkable for the full contouring, every 25 feet, of the hill-sides. The 25-in. map has just been published. A lithographed copy of part of the 1-in. map has been printed for use at Sedbergh School, and may be obtained from the school bookseller, Mr. Jackson. The scenery is described in Rev. W. Thompson's 'Sedbergh, Garsdale, and Dent' and in the 'Craven Highlands,' by H. Speight. The 'Flora of West Yorkshire,' by Arnold Lees, and Davis and Lees' 'West Yorkshire," are almost too well-known to need mention. 'Florula Sedberghensis,' by Rev. W. Thompson, and Mr. John Handley's 'Sedbergh, a few notes on its Flora,' are valuable tracts. The Geological Survey have published 'Explanation of Quarter Sheet 98, S.E.' (including Helm Knott, Holme Fell), and 'Explanation of Quarter Sheet 98, N.E.' (Sedbergh, Tebay, and Kendal). Those who still possess the Y.N.U. Circular of the 1887 meeting will find it useful. The report of that meeting was published in the 'Naturalist,' 1887, page 279, and is followed on page 285, by Mr. Joseph A. Martindale's 'Sedbergh District Lichens.' The 'Sedberghian,' July, 1889, contains a list of birds reported to have bred near

Sedbergh. There is a cyclostyled 'List of Moths and Butterflies of Sedbergh,' by Mr. G. Watkinson, Sedbergh School, 1891.

ROUTES.—

All parties will leave Sedbergh Railway Station at 11-3 a.m. as follows :—

I.—Lune Valley. As far as possible following the course of the Rivers Lune and Rawthey ; six miles. Leader, Mr. John Handley.

II.—Garsdale, *vid* Strait Bridge, Dovecote Gill, Danny Bridge ; seven miles. Leader, Rev. W. Thompson, M.A.

III.—GEOLOGICAL.—Drive to Rawthey Bridge for exploration of Uldale and the Pennine Fault ; six miles walking. Fare two shillings. Those who wish to secure seats should apply not later than Saturday to Mr. Hugh Richardson, M.A., Sedbergh School.

Mr. Richardson would also be glad to hear beforehand from any gentlemen who would like to arrange for a good walk on the Saturday afternoon.

THE DISTRICT.—The Rev. J. H. Mackie, M.A., writes :—Sedbergh lies at the junction of three small valleys, where they open out into the picturesque valley of the Lune : these are (1) the valley of the Dee, which runs eastward past Dent, a place for ever associated with the name of Professor Sedgwick ; (2) the valley of the Clough, or Garsdale ; (3) the valley of the Rawthey, which leads north-eastward to Kirkby Stephen. Between these valleys lie lofty fells, those towards the east being outliers of the Pennine Chain, whilst those to the north of Sedbergh, which lie between the Rawthey and the Lune, form a detached mass of still older rocks, and are the highest ground in Yorkshire. From their summits, 1,500 to 2,220 feet high, may be obtained clear views of Morecambe Bay and the Lake Hills : their steep and picturesque ghylls, with tawny stream and foaming waterfall, afford some of the most interesting Geology in England, according to the recent surveyors ; whilst by the sides of beck and stream grow many a rare flower and fern. Hartley Coleridge, for some time a master of Sedbergh School, is said to have preferred this district, for many reasons, to the Lake district itself. Here, without doubt, the naturalist, exhilarated by the bracing air, may obtain an almost ideal day's outing, and whether bent on Geology, Botany, or Zoology, has no small chance of a new 'find,' for the district has by no means been exhausted in any branch of Natural History.

GEOLOGY.—This Section will be officially represented by Mr. R. H. Tiddeman, M.A., F.G.S., and Mr. J. H. Howarth, F.G.S.

Mr. Aubrey Strahan, M.A., F.G.S., of H.M. Geological Survey, writes as follows :—The following notes on the excursion to Rawthey Bridge and Taith's Gill are in great part condensed from the Geological Survey Memoir on the country around Mallerstang, etc., in which the whole district is described in great detail. Figures 7, 8, and 10, give sections across the ground to be traversed. Owing to faulting and inversion, the true sequence of the rocks is not always obvious. They are therefore enumerated below in their proper order :—

- Carboniferous
  - Millstone Grit
  - Carboniferous Limestone Series, containing
    - Crow Limestone
    - Little Limestone
    - Main Limestone
    - Underset Limestone
    - Three Yards Limestone
    - Five Yards (or Horseshoe) Limestone
    - Middle Limestone
    - Simonstone Limestone
    - Hardraw Scar Limestone
    - Great Scar Limestone
  - Lower Limestone Shales
  - Carboniferous Basement Beds—coarse red conglomerate and sand-stone

GREAT UNCONFORMITY—

- Upper Silurian
  - Coniston Grits
  - Coniston Flags
  - Stockdale Shales
    - Pale Slates or Browngill Beds
    - Graptolitic Mudstones or Skelgill Beds
  - Coniston Limestone Series

INTRUSIVE IGNEOUS ROCKS—

Diabase (Blue Caster)
Mica-trap Dykes (in all the Silurian Rocks)
Felsite as Sills and Dykes (in all the Silurian Rocks).

Sedbergh stands on glacial deposits, heaped together in characteristic mounds. Some of the gills leading down from the Howgill Fells afford fine sections of tile with scratched stones. The underlying rock can be seen from the road in the bed of the Rawthey at Straight Bridge, and again in Hebblethwaite Gill, to be the very coarse red conglomerate, which constitutes the base of the carboniferous system.

In the river, 300 yards north of the second mile post, it rests unconformably on Coniston Grits. The Howgill Fells, on the west side of the Rawthey, consist of Coniston Grits over-lying Coniston Flags, while the rising ground to the east of the road is formed by the Pale Slates with the Coniston Limestone rising from beneath them in an anticline. Both are penetrated by intrusive sills of felsite as well as the usual mica-trap dykes. At the Cross Keys Inn the road passes on to the Coniston Flags of which there are many exposures; up the slopes to the east two sills of felsite are intruded in the flags, which a large boss of diabase rises through the Pale Slates of Blue Caster. The river Rawthey enters twice through the Graptolitic Mudstones near Rawthey Bridge. East of the bridge they are faulted against Coniston Flags; west of the bridge a portion of the Pale Slates intervenes. In the last-named locality graptolites may be collected. Five hundred yards east of Rawthey Bridge a dyke of mica-trap, 6-ft. wide, crosses the river, and re-appears 200 yards further on. The Dent (or so-called Pennine) Fault crosses the river at Hall Intack. It consists here of two parallel fractures about 100-yds. apart. Between the two the base of the Carboniferous Limestone can be traced in the South Bank over some exposures of Pale Slates, but east of them the base is thrown below the level of the river, which runs for 80 or 90 yards between cliffs of massive limestone. This is succeeded by shales, sandstones, and thin limestones, having at their top the Hardraw Scar or lowest of the Yoredale Limestones. All these strata are inverted so as to dip *apparently* at angles of 70 deg. to 80 deg. westward (the actual dip being 110 deg. to 100 deg.) eastward; but a few yards further on the Simonstone Limestone can be identified with a gentle westward dip, and beyond it the Hardraw Scar Limestone rising from beneath the Simonstone in its normal position. The strata therefore lie in a synclinal form, the western edge of the syncline being turned over from 10 deg. to 20 deg. beyond verticality along the line of the fault. The Hardraw Scar Limestone occupies the bed and banks of the river to and beyond Uldale Bridge, which however the dip changes to a little east of south, so that here is presented an anticline. This arrangement of the strata, in a more or less pronounced form, can be recognised in many of the gills further south. In its upper reaches, the Rawthey crosses in ascending succession the Simonstone, Middle, Horseshoe (or Five Yards), Underset, and Main Limestones, a seam of coal occurring between the two last named. In the north-eastern slope of West Baugh Fell, the highest limestones of the district can be identified, namely the Little and Crow Limestones, before reaching the plateau of Millstone Grit.

Taith's Gill in its uppermost part shows the Crow, Little and Main Limestone, but the Underset is not recognizable. The Crow Limestone also is represented only by two inches of black chert. Two hundred and fifty yards above the Dent Fault the strata are bent up in a sharp anticline, which is succeeded westwards by a still sharper syncline with the beds in its western margin inverted; these folds corresponding to the anticline and syncline noted in the Rawthey. The Three Yards, Horseshoe, Simonstone, and Hardraw Scar Limestone, can be identified in proper order, but the last-named is thrown immediately against the Great Scar Limestone by the eastern branch of the Dent Fault. This rock is again faulted by the western Dent Fault against Pale Slates, and by still another fault these Pale Slates are faulted against Coniston Limestones with two small felsite dykes. Here, therefore, the Dent Fault consists of three distinct lines of fracture. Lower down the stream at Taith's there are good exposures of a sill of felsite intruded along the bedding-planes of the Coniston Limestone. North of Taith's the stream runs north-westwards in Coniston Limestone and exposes dykes of mica-trap and a small boes of felsite.

BOTANY.—The Botanical Section will be officially represented by Mr. P. F. Lee and Mr. Chas. Crossland.

Mr. Hugh Richardson, M.A., and Mr. John Handley write as follows:—The more striking of the spring flowers are Bird Cherry along the lanes, Globe-flower by the streams, and Mealy Primrose in upland meadows. Shade after shade of colour sweeps over the hayfields as yellow Buttercup is succeeded by purple Geranium (*G. sylvaticum*) and white Dog-daisy. Bogbean, Butterwort, Sundew (*D. rotundifolia*), Grass of Parnassus and Cranberry grow on the lower moors. *Alchemilla alpina* and *Rubus chamæmorus* are on the higher fells. By the mountain streams grow several Saxifrages—*S. stellaris*, *hypnoides*, *aizoides*; but *C. oppositifolium* which grows on Penyghent has not been recorded. *Geum rivale* grows by the streams, in some places *Mimulus luteus*. Herb Paris and *Campanula latifolia* are in the woods. One of our rarest flowers is Spignel (*Meum athamanticum*) in the Howgill Pastures, near Beckhouses. Of orchids *Hab. bifolia* and *chlorantha* grow in the hayfields, *albida* and

Gymnadenia are found on a piece of waste ground near Middleton, lesser Twayblade among the Garsdale heather. Several species of *Hieracium*, *Galium* and *Epilobium* have been found. *Lamium album* is curiously absent within some miles. *Viola lutea* occurs on the limestone. Other species worthy of mention are Yellow Poppy, Mallow, *Genista anglica*, Yellow Iris, *Sedum anglicum*, *Circæa alpina*, *Rosa spinosissima* (a few bushes, *Geranium phæum* (introduced?), *Cardamine amara*, Marsh Cinquefoil. The following are also likely to be found on the Lune and Rawthey route: — *Senecio saracenicus*, *Narthecium ossifragum*, *Galium boreale*, *G. mollugo*, *Hypericum dubium*, *Carduus heterophyllus*, *Serratula tinctoria*, *Habenaria viridis*, *Orchis pyramidalis*, *Epipactis latifolia*, *Lathræa squamaria*, *Hieracium murorum*, *H. tridentatum*, *H. crocatum*, and *H. umbellatum*.

Ferns.—Parsley Fern is common on the Silurian Fells. Filmy Fern is recorded for Cautley Spout and Black Force. *Trichomanes* and Wall Rue are found on bridges; *A. viride* and *C. fragilis* on the limestone. *P. dryopteris* and *phegopteris* are plentiful in the thickets. *Botrychium* and *Ceterach* have been found.

Mosses and Hepatics.—Three clubmosses are found on the fells. Two or three species of *Nitella* or *Chara* await identification. At the last Sedbergh meeting eighty-nine mosses, twenty-one hepatics, and fifty lichens were recorded. Mr. Martindale's list of lichens contained ten species then new to the West Riding Flora.

VERTEBRATE ZOOLOGY.—

Mr. Hugh Richardson, M.A., writes:—The following birds among others have bred in the district within recent years:—Peregrine, Kestrel, Merlin, Spotted Flycatcher, Dipper, Ring Ouzel, Whinchat, Wheatear, Curlew, Golden Plover, Snipe, Sandpiper, Wood Warbler, Raven, Crow, Magpie, Kingfisher, Heron, Grey Wagtail, Swift, Sandmartin, Redstart, Tree Pipit, Red Grouse, Cuckoo, Waterhen, Teal, Blackheaded Bunting. There is no satisfactory record for Stonechat, and no recent record for Dotterel.

Mr. Riley Fortune has also found the following breeding in the district within the last half-dozen years:—Common Buzzard, Sparrow Hawk, Yellow Wagtail, Pied Flycatcher, Goldcrest, Creeper, all the Tits, and Mallard.

ENTOMOLOGY.—The Entomological Section will be represented, in the absence of its officers, by Mr. Walter F. Baker, F.E.S.

Lepidoptera.—Mr. Hugh Richardson states that over 100 species of Lepidoptera are on record; some require confirmation, but among those less easily mistaken are the Poplar, Death's Head, and Humming Bird Hawks, Northern and Ghost Swifts, Clouded Buff, Wood Tiger, Fox Moth (larvæ), Emperor (larvæ), Clouded Magpie, Red Admiral, Painted Lady, Pearl Bordered Fritillary (*A. euphrosyne*). The mountain species *C. cavus* has been looked for, but there is no satisfactory record.

Coleoptera.—Mr. Walter F. Baker, while in the district about a month ago, found, considering the season of the year, a great number of species. The nature of the country is unfavourable to aquatic species, but the semi-aquatic *Dianoïs* and *Elmis* were common, and the various species of *Coccinellidæ* were common in the pine woods, and *Corymbites cupreus* and *C. pectinicornis* were abundant.

CONCHOLOGY.—This section will be represented, in the absence of its officers, by Mr. W. Denison Roebuck, F.L.S.

Mr. Hugh Richardson, M.A., writes that the limestone to the east will probably be the best hunting ground, as there is but little standing water and the streams are mostly too rough and rapid for bivalves. *Limnæa peregra*, *Ancylus fluviatilis*, *Helix arbustorum*, *H. hortensis*, *Hyalinia fulva*, *H. radiatula*, *H. nitidula*, *Azeca tridens*, *Helix rupestris*, *Vertigo pygmæa*, *Arion ater*, *A. circumscriptus*, *Agriolimax agrestis*, *Helix rufescens*, *H. rotundata*, *Clausilia rugosa*, and *Cochlicopa lubrica* are recorded. But the district has hardly been worked yet, and such things as *Balea* should be sought for.

☞ **MEMBERS OF THE GENERAL COMMITTEE** are hereby specially convened to attend this meeting for the purpose of completing the business of the Annual Meeting, by receiving and considering the Balance Sheet and Statement of Accounts for 1893, which, having been duly audited, will be submitted by the Hon. Treasurer.

PROGRAMME OF MEETINGS.—

3-15 p.m.—Sectional Meetings
3-30 p.m.—Meat Tea, 2/- each
4- 0 p.m.—General Meeting

} At the Bull Hotel, Sedbergh.

Yorkshire Naturalists' Union.

President:

R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WALTER F. BAKER, F.E.S., Whitkirk, Leeds.

THE HUNDRED-AND-NINTH MEETING

WILL BE HELD AT

PONTEFRACT

For the investigation of the neighbourhood of

FERRYBRIDGE

FRYSTON and BYRAM PARKS, etc.,

On SATURDAY, June 16th, 1894.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham stations on the G.N., H. & B., L. & Y., L. & N.W., M.S. & L., Midland, and N.E. Railways which have booking arrangements for Pontefract, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets will be available for return on the following Sunday or Monday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction and re-book to Pontefract; the reduction of fare will be granted for both portions of the journey.

HOTEL ACCOMMODATION.—Members will find accommodation at the Red Lion and the Elephant Hotels.

BOOKS AND MAPS.—The district for investigation is included in Sheets 87 N.E. and 87 N.W. one-inch Ordnance Maps (also published geologically coloured). There appears to be no special papers on this part of the country, but reference may be made to George Roberts' 'Topography and History of Lofthouse,' both volumes, to Davis and Lees' 'West Yorkshire,' and to Lees' 'Flora of West Yorkshire.'

ROUTES.—Three Routes have been arranged—

I.—To the quarries on the Byram Estate.

II.—To the osier beds, pools and ditches near the old church of Ferry Fryston.

III.—To the wooded parts of the Fryston Estate of Lord Houghton.

All parties will leave Ferrybridge Station on the arrival of the 9-57 train from Pontefract. Members arriving earlier or later may profitably occupy themselves on any of these routes.

Permission to visit their estates is kindly granted by Lord Houghton and Sir John Ramsden. The North Eastern Railway have also granted permission to the Members to pass along the embankment north of Ferrybridge Station.

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

GEOLOGY.—This Section will be officially represented by its President, Mr. Thos. Tate, F.G.S., and its Hon. Secs., Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

Prof. T. McKenny Hughes, of the Woodwardian Museum. writes as follows:—The geological structure of the district round Ferrybridge is simple though the details are complicated and the questions suggested by an examination of the rocks of the area are difficult and of wide bearing. The beds which form the base of the Lower Mesozoic rocks, that is to say the Magnesian Limestone series, rest unconformably upon various members of the Middle Coal Measures, which they traverse with an outcrop trending in an NNW. direction. The escarpment due to these harder rocks, as compared with the soft overlying Trias is cut through by the Aire at Ferrybridge. The Carboniferous rocks stretch away to the west in rolling rounded outline, with here and there a crag where harder beds project, and on the east irregular patches of Pleistocene sands and gravel, with the estuarine alluvium partly natural and partly artificial, extend to the sea along a low flat country through which the rivers run between banks often at a higher level than the surrounding ground. One might have thought that the easiest point would be the determination of the exact position of the break between the Magnesian Limestone series and the Coal Measures, but this has proved a question of some difficulty, and a trip to Pontefract will enable members to study the massive yellow sandstones which occur along the road into the town, and which were long of doubtful age until by the discovery

of *Schizodus obscurus* 'in situ' I referred them to the Magnesian Limestone series. The occurrence of red beds at the top of the lower series and at the base of the overlying series may be studied in this district under favourable circumstances, as the several members of both the upper and the lower series differ so much in character that various hypotheses can be put to the test. One fact that must be taken account of is that a land surface which has been exposed to all the oxidizing agencies of subaërial denudation was submerged and covered by newer deposits much of the material of which was derived from this oxidized superficial deposit of the sinking land. It is a notable fact that the red stained rocks of the older system and the red beds at the base of the new find their counterpart at each great stratigraphical break in the geological sequence. The presence of calcareous beds always interferes with this development of colour.

The base of the Magnesian Limestone series may be examined here and there between Pontefract and the river Aire near Weldon, both south and north of which locality quarries have been opened in the Lower Limestone, which here dips at a small angle in an east-south-easterly direction. From Ferry Bridge the Middle Marls, dividing as its name implies the Lower from the Upper Magnesian Limestone, trend irregularly in a south south-easterly direction. The Upper Magnesian Limestone is exposed in quarries near Knottingley and Womersley, and on the north and south side of the patch of Upper Marls which occurs about half way between those towns. It will be observed that while the marls and sandstones are generally red the limestones are yellow. The different texture of the Upper and Lower Limestone may also be noted. In the characteristic fossil the *Schizodus* (*Axinus*) some will see the forerunner of the Mesozoic *Trigonia*. Over the plains to the east of Ferrybridge it is inferred that the Bunter Sandstone occurs at a small depth, but the 'drowned valleys' are silted up, and sands, some of marine origin and some here and there probably eolian and afterwards levelled under water, occur in low banks and terraces all over these 'regiones inundatæ.' Perhaps the most interesting subject for investigation, and one which can nowhere be so well studied as here, is the mode of formation and character of the natural and artificial *warp*. The Humber and its tributaries carry a great quantity of sediment in suspension. This tidal silt is being carried to and fro, stirred up and transported out into the Estuary with every freshet from the higher ground and every ebb; borne back by every flowing tide, but settling to the bottom between whiles, whenever the velocity of the currents is sufficiently reduced; while now and then the river overflows its banks and throws down, the coarser first, the finer later, when the water has spread out over a wider area. Thus these rivers, like the Mississippi and the Po, have raised their banks, and also in time their bed, and ships may be seen full sail floating above the level of the surrounding corn-fields. In later times man interfered and raised the banks to control the river and give a sound roadway for the horses that towed the barges. When their banks gave way the surrounding lower ground was of course submerged, but it was found that the land was so improved by the silt thrown down from the turbid water that this compensated the farmer for his temporary loss; and soon he adopted the plan of renovating impoverished land by turning on the tidal water over large areas enclosed within embankments, regulating the amount and distribution of the sediment by a regular system of sluices and artificial channels. The deposit thus laid down from the nature of the case occurs in layers; the coarser settles first, the finer last; and thus a laminated clay is formed, each tide or inrush being marked by the change of sediment—and the time allowed for its precipitation by the thickness of the layer just as at the bottom of the mill-pond the Sundays were noted by the thicker bands of mud.

BOTANY.—The Botanical Section will be officially represented by its President, Mr. P. F. Lee, and its Hon. Secs., Messrs. Albert H. Pawson, M. B. Slater, F.L.S., and Charles Crossland.

Mr. George Roberts writes that the following plants have been found in the district:—*Lysimachia nummularia*, *Melilotus officinalis*, *Parnassia palustris*, *Geum rivale*, *Echium vulgare*, *Chlora perfoliata*, *Reseda lutea*, *Sagittaria sagittifolia*, *Malva moschata*, *Viola odorata*, *V. hirta*, *Genista tinctoria*, *Anthyllis vulneraria*, *Campanula latifolia*, *Nepeta cataria*, *Lysimachia vulgaris*, *Veronica anagallis*, *Asplenium ruta-muraria*.

Mr. J. Neale records the following plants as occurring near Ferry Fryston Church, in ditches or on the railway or in water meadows:—*Utricularia neglecta*, *Hottonia*, *Polygonum bistorta*, *Typha*, *Nasturtium palustre*, *Lysimachia nummularia* (extremely abundant), *Lythrum salicaria*, *Apium nodiflorum*, *Œnanthe*

(two or three species), *Veronica anagallis*, *V. scutellata*, *Lycopus*, *Anagallis tenella*, *Phragmites*, *Aira*. In woods we may expect *Epipactis*, *Ophrys muscifera*. In the quarries at Byram *Doronicum* is very common, also *Conium maculatum*.

Mr. M. B. Slater states that the following are some of the rarer mosses which are recorded in Lees' 'Flora of West Yorkshire' for the neighbourhood of Pontefract:—*Pottia lanceolata*, *P. starkeana*, *Barbula vigida*, *B. ambigua*, *B. lamellata*, *B. rigidula*, *Zygodon viridissimus*, *Fissideus viridulus*, *F. pusillus*. At this season the cortical mosses of the genera *Ulota* and *Orthotricum* may be got in their best fruiting state on the trunks of trees in shady situations. No *Hepaticæ* are recorded in the Flora for the district. Several may be expected to occur. The trunks of trees, and the shady sides of stone walls in damp places, also amongst stones in the debris of old quarries are the sites where they are most likely to be met with.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by its President, Mr. John Gerrard, M.B.O.U., and its Hon. Secs., Messrs. Jas. Backhouse, F.Z.S., M.B.O.U., and Riley Fortune, F.Z.S.

Mr. Leonard Gill communicates the following:—In the more thickly wooded parts the usual warblers, including the Garden. Grasshopper and Wood Warblers are to be heard. The nests of the Marsh Tit, Lesser Redpoll and Lesser Whitethroat are found fairly frequently in the neighbourhood, whilst the Turtle Dove nests regularly and abundantly near Ferrybridge. The Pied Flycatcher has within the last few years been several times seen in the district, and the Hawfinch breeds regularly within four miles and probably in the Fryston Woods. As the Green and Greater Spotted Woodpeckers are breeding in nearly all the woods near they may be expected to be met with at Fryston, and in the sides of the old quarries Wheatears and possibly one or two species of Owls may be found. In addition, Mr. J. Neale, M.A., informs us that in the neighbourhood of Ackworth the Nightingale has of late years been on the increase. It is common at Wentbridge and Stapleton, and the Redshank has bred here this year.

ENTOMOLOGY.—This Section will be officially represented by its President, Mr. James H. Rowntree, and its Hon. Secs., Messrs. A. E. Hall, F.E.S., and Joseph Coe.

Lepidoptera.—Mr. Wm. Hewett obtained the following when in the district a few weeks ago:—*Platypteryx falcula*, *Coremia unidentaria*, *Melanippe subtristata*, and *M. fluctuata*. Mr. Jos. Neale, M.A., states that *Smerinthus populi* and *Dicranura vinula* are also abundant.

Coleoptera.—The district is one particularly suitable for the coleopterist, and the phytophagous species are in great abundance. *Rhagium*, *Toxotus*, *Pyrochroa*, *Anaspis*, *Mordella*, and the various species of *Chrysomelidæ* are common. The sweeping net should be well used, and will amply repay the sweeper. Amongst the *Lamellicornia*, *Geotrupes sylvaticus* and *Aphodius luridus* are common, and *A. subterraneus* occurs rarely. Very little appears to have been done with regard to the aquatic species, despite the apparently favourable nature of the district.

Other Orders.—Mr. Neale states that vast numbers of Rubytails (*Chrysididæ*) may be observed flying in and out of holes in the sand banks on the Byram estate. Beyond this and the fact that two species of *Notodonta* are found in the neighbourhood nothing further appears to be known to the Ackworth naturalists.

CONCHOLOGY.—The Conchological Section will be officially represented by its President, Mr. W. Nelson, and one of its Hon. Secs., Mr. W. E. Scharff (who has recently accepted the office).

Mr. Wm. Nelson has found the following shells in this district:—*Limnæa auricularia*, *L. glabra*. *L. stagnalis*, *Physa hypnorum*, *P. fontinalis* var. *inflata*, *Planorbis spirorbis*, *P. corneus*, *P. albus*, *P. umbilicatus*, *Helix arbustorum*, *H. virgata*, *H. pygmæa*, *H. pulchella*, *Clausilia laminata*, *C. perversa*, *Pupa cylindracea*, *P. marginata*, *Paludina vivipara*, and *Hyalinia crystallina*.

MICRO-ZOOLOGY AND MICRO-BOTANY.—The district is very favourable for this section owing to the large number of old and stagnant pools but very little appears to have been done as yet. *Volvox* is common in the various ponds, together with *Amœba*, *Actinophrys*, *Hydra*, and various forms of desmids.

PROGRAMME OF MEETINGS.—

4-47 p.m.—A train leaves Ferrybridge for Pontefract.

5- 0 p.m.—Meat Tea, 2/- each
5-30 p.m.—Sectional Meetings
5-45 p.m.—General Meeting

} At the Red Lion Hotel, Pontefract.

Yorkshire Naturalists' Union.

President:

R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Ex-Presidents:

Rev. Wm. Fowler, M.A., Liversedge.
H. Clifton Sorby, LL.D., F.R.S., etc., Sheffield.
Prof. W. C. Williamson, LL.D., F.R.S., Manchester.
John Gilbert Baker, F.R.S., F.L.S., Kew.
Rt. Hon. Lord Walsingham, M.A., F.R.S., Thetford, Norfolk.
Rev. W. H. Dallinger, LL.D., F.R.S., etc., London.
Sir Ralph Payne-Gallwey, Bart, M.B.O.U., Thirkleby Park.
Wilfred H. Hudleston, M.A., F.R.S., Weybridge.
Henry Eeles Dresser, F.L.S., F.Z.S., London.
Rt. Rev. Wm. Walsham How, D.D., Lord Bishop of Wakefield.
Prof. A. H. Green, M.A., F.R.S., F.G.S., Oxford University.
Chas. P. Hobkirk, F.L.S., Dewsbury.
Henry Seebohm, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WALTER F. BAKER, F.E.S., Whitkirk, Leeds.

THE HUNDRED-AND-TENTH MEETING

WILL BE HELD AT

KNARESBOROUGH,

For the investigation of the

NIDD VALLEY

From Nidd Viaduct to Goldsborough Mill,

On SATURDAY, July 14th, 1894.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire and Durham stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Knaresborough, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets will be available for return on the following Sunday or Monday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction and rebook to Knaresborough; the reduction of fare will be granted for both portions of the journey.

HOTEL ACCOMMODATION.—Members will find accommodation at the Elephant and Castle Hotel.

Permission to visit their estates is kindly granted by Lord Harewood, Captain Slingsby, and Mr. Basil T. Woodd.

CIRC. 110

BOOKS AND MAPS.—The district for investigation is included in Sheet 93 N.W. One-inch Ordnance Map (also published geologically coloured). Grainge's 'History of Harrogate and Forest of Knaresborough,' and Thorpe's 'Guide to Harrogate' contain natural history notes. Speight's new book, 'A Yorkshire Rhineland,' contains articles on the fauna and flora of the neighbourhood by leading local naturalists. Lees' 'Flora of West Yorkshire,' and Davis and Lees' 'West Yorkshire' should be consulted; and Calvert's 'History of Knaresborough' contains an old and interesting list of plants.

ROUTES.—

I.—Mr. J. Farrah will lead a party along the north side of the river, passing Fort Montague and Abbey Plain, then crossing the river at Grimbald Bridge, and proceeding to Goldsborough Mill and Birkham Wood, working along the bank of the river to High Bridge, then proceeding through Scriven Park to Farnham Mires, returning by Farnham and Scriven.

II.—Mr. Riley Fortune will lead a party through Scriven Park, up the valley of the Nidd to Nidd Viaduct, returning along the upper side of the river until Conyngham Park is reached.

Both parties start from Knaresborough Station at 10-57. Members arriving late are advised to proceed direct through Scriven Park to Farnham Mires.

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

GEOLOGY.—This Section will be officially represented by its President, Mr. Thos. Tate, F.G.S., and its Hon. Secs., Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

Mr. J. H. Lofthouse writes as follows:—At Knaresborough the Lower Magnesian Limestone rests upon the Plumpton Grit, the highest of the Millstone Grit series occurring in this district. Along the banks of the Nidd from the foot of the Castle Hill to near Grimbald Bridge, many fine sections, showing the unconformity, are to be seen. The Lower Limestone, which in this district attains a thickness of over 150 feet, consists chiefly of thick irregular beds of yellow limestone, generally soft and decomposing readily near the surface. In some places where it is seen resting on the Millstone Grit the lowest beds contain fragments of the latter, and has somewhat the character of a conglomerate, being coarser in texture and harder in substance than the main mass of the limestone. In this district the limestone contains no fossils. Near Goldsborough Mill, and at several places on the banks of the Nidd above Knaresborough, sections of the Middle Marls are to be seen. This is a very irregular deposit, and does not attain a very great thickness in this district. The quarries near the Low Bridge should be visited, and also those behind the bold rugged escarpment of the Lower Limestone, on the south bank of the Nidd, called Grimbald Crag. Between the Nidd Viaduct and the High Bridge several outlying patches of limestone occur, but the principal rocks through which the Nidd runs belong to the Third Grits of the Millstone Grit Measures and their accompanying shades. There are many objects of interest to geologists along this route, including St. Robert's Chapel and Cave, Mother Shipton's Cave, and the Dropping Well.

BOTANY.—The Botanical Section will be officially represented by its President, Mr. P. F. Lee, and its Hon. Secs., Messrs. Albert H. Pawson, M. B. Slater, F.L.S., and Charles Crossland.

Mr. J. Farrah writes:—Plant lovers have a delightful treat in store. The ground bordering each side of the river Nidd and extending from the Low Bridge to Grimbald Bridge abounds in rarities, especially the Magnesian Limestone cliffs and the grassy knolls on the left bank. The former, near Low Bridge, tower perpendicularly to an immense height, the latter, in most charming irregularity, slope to the river's edge. It would be difficult, indeed, to find another place where, in so limited an area, so many of Flora's rarest productions delight the eye of the botanist and offer to the student of plant distribution material for his profoundest studies. The left bank of the river affords:—*Chelidonium majus*, *Arabis hirsuta*, *Cheiranthus cheiri*, *Reseda luteola*, *Rubus suffruticulosa*, *Helianthemum vulgare* and at the time of writing *Silene nutans* spreads its laciniate petals, coyly nodding to the lingering breezes as it ladens them with its delicate perfume. Very few botanical excursions yield such dainty fare as this! Continuing we shall see *Hypericum montanum*, *Geranium sanguineum*, *G. pratense*, *G. pusillum*, and *G. columbinum*; *Euonymus europæus*, *Ononis arvensis*, *Pyrus aria*, *Pimpinella saxifraga*, *Viburnum opulus*, *Asperula cynanchica*, *Scabiosa columbaria*, *Lactuca muralis*, *Atropa belladonna*, *Verbascum thapsus*, *Linaria cymbalaria*, *Salvia verbenaca*, *Calamintha menthifolia*, *Lamium galeobdolon*, *Daphne laureola*, *Urtica urens*, *Allium vineale*, *A. scorodoprasum*, *Koeleria cristata*, *Schlerochloa rigida*, &c. The rarest ferns are:—*Polystichum aculeatum*, *Asplenium trichomanes*, and *A. ruta-muraria*. The right bank of the river yields:—*Stellaria nemorum*, *Geum rivale*, *G. intermedium*, *Circæa lutetiana*, *Ribes nigrum*, *Conium maculatum*, *Myrrhis odorata*, *Galium verum*, *Carduus nutans*, *Campanula latifolia*, *C. glomerata*, *Gentiana amarella*, *Origanum vulgare*, *Calamintha acinos*, *Lithospermum officinale*, *Echium vulgare*, *Orchis pyramidalis*, *O. ustulata*, *Gymnadenia conopsea*, *Paris quadrifolia*, &c. In the meadows will be seen the vernal form of *Colchicum autumnale*. Amongst the plants that should be carefully looked for are:—*Malva moschata*, *Asperula ordorata*, *Chlora perfoliata*, *Geranium lucidum*, *Astragalus glycyphyllos*, *Genista tinctoria*, *Bryonia dioica*, *Lactuca virosa*, and *Inula conyza*. A saunter through Scriven Park (the seat of Captain Slingsby) under the delightful shade of the avenue of noble beeches

would be enjoyed by all who availed themselves of it. This is on the road to Farnham and to Farnham Mires where grow :—*Primula farinosa*, *Bryonia dioica*, *Anagallis tenella*, *Inula dysenterica*, *Sium angustifolium*, *Silaus pratensis*, *Lithospermum officinale*, &c.

Mr. M. B. Slater states that the following of the rarer Mosses are recorded for the Knaresborough district in West Riding Flora :—*Gymnostomum rupestre*, *Fontinalis squamosa*, *Hedwigia ciliata*, for Upper Nidderdale ; *Dicranella squamosa*, *Eucladium verticillatum*, *Barbula lævipila*, *B. intermedia*, *B. papillosa*, *Webera carnea*, *W. albicans*, *Bryum pallens*, *Leskea polycarpa*, *Anomodon viticulosus*, *Eurhynchium crassinervium*, *Rhynchostegium tenellum*, *R. murale*, for the neighbourhood of Knaresborough ; *Dicranum majus*, *Tetrodontium brownianum*, for Plumpton Rocks ; *Scleropodium cæspitosum*, near Cowthorpe Weir.

Hepatics.—*Lunularia vulgaris*, Cowthorpe Weir ; *Frullania dilatata*, *F. tamarisci*, *Radula complanata*, *Scapania undulata*, Knaresborough district ; *Jungermania turbinata*, near Plumpton Rocks. At this season the genus of bog mosses *Sphagnum* fruits. If any boggy ground occur in the route of the excursion it should be explored for these.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by its President, Mr. John Gerrard, M.B.O.U., and its Hon. Secs., Messrs. Jas. Backhouse, F.Z.S., M.B.O.U., and Riley Fortune, F.Z.S.

Mr. Riley Fortune writes as follows :—The district to be visited is densely wooded and well populated with animal life. Birds, especially warblers, abound. The following is a list of the principal vertebrates likely to be met with during the day, and which breed regularly in the parts to be investigated. Many rarities, of course, frequently occur, but for the purposes of this excursion, there is no need to make special mention of them.

Mammalia.—Long Eared, Noctule, Pipistrelle and Whiskered Bats. Common, Lesser and Water Shrews. Fox, Weasel, Stoat, Otter, Dormouse. Bank, Field and Water Voles.

Birds.—Dipper, Lesser Whitethroat, Blackcap, Garden Warbler, Goldcrest, Woodwren, Grasshopper Warbler, Reed Warbler, Long-tailed and Marsh Tits, Nuthatch, Creeper, Yellow and Grey Wagtails, Pied and Spotted Flycatchers, Hawfinch, Tree Sparrow, Lesser Redpoll, Bullfinch, Jay, Magpie, Nightjar, Great and Lesser Spotted and Green Woodpeckers, Kingfisher, Barn, Tawny and Long-eared Owls, Sparrowhawk, Kestrel, Mallard, Stock Dove, Sandpiper, Woodcock. The Quail and Nightingale have also frequently nested during late years.

Reptiles and Amphibians.—Grass Snake, Adder, Lizard, Slow-worm (the latter grow to a very large size) Great Crested, Smooth and Palmated Newts.

Fishes.—Perch, Ruffe, Bullhead, Sticklebacks, Barbel, Gudgeon, Roach, Chub, Dace, Minnow, Tench, Loach, Pike, Trout, Grayling, Eels and Lampreys.

ENTOMOLOGY.—This Section will be officially represented by its President, Mr. James H. Rowntree, and its Hon. Secs., Messrs. A. E. Hall, F.E.S., and William Hewett.

No records whatever are available for this section.

CONCHOLOGY.—The Conchological Section will be officially represented by its Hon. Sec., Mr. F. W. Fierke.

Knaresborough itself, and the limestone cliffs at Grimbald Crag, are rich in land shells, including *Helix lapicida* and other species of calcareous habitat. Formerly many good water shells were to be found in the Asp Ponds, now filled up.

PROGRAMME OF MEETINGS.—

4-30 p.m.—Meat Tea, 2/- each
5-15 p.m.—Sectional Meetings
5-30 p.m.—General Meeting

} At the Elephant and Castle Hotel, Knaresborough.

Yorkshire Naturalists' Union.

President:

R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Ex-Presidents:

REV. WM. FOWLER, M.A., Liversedge.
H. CLIFTON SORBY, LL.D., F.R.S., etc., Sheffield.
PROF. W. C. WILLIAMSON, LL.D., F.R.S., Manchester.
JOHN GILBERT BAKER, F.R.S., F.L.S., Kew.
RT. HON. LORD WALSINGHAM, M.A., F.R.S., Thetford, Norfolk.
REV. W. H. DALLINGER, LL.D., F.R.S., etc., London.
SIR RALPH PAYNE-GALLWEY, BART, M.B.O.U., Thirkleby Park.
WILFRED H. HUDLESTON, M.A., F.R.S., Weybridge.
HENRY EELES DRESSER, F.L.S., F.Z.S., London.
RT. REV. WM. WALSHAM HOW, D.D., Lord Bishop of Wakefield.
PROF. A. H. GREEN, M.A., F.R.S., F.G.S., Oxford University.
CHAS. P. HOBKIRK, F.L.S., Dewsbury.
HENRY SEEBOHM, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WALTER F. BAKER, F.E.S., Whitkirk, Leeds.

THE HUNDRED-AND-ELEVENTH MEETING

WILL BE HELD AT

SOUTH CAVE,

For the investigation of the neighbourhood of

DREWTON DALE, WEEDLEY SPRINGS,

AND

WOLD DALE,

ON

Bank Holiday Monday, Aug. 6th, 1894.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G.N., H. & B., L. & Y., L. & N.W., M.S. & L., Midland, and N.E. Railways which have booking arrangements for South Cave or Brough, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets will be available for return on the following day.

Members desirous of spending the week-end in the district may book on the previous Saturday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction and re-book to South Cave or Brough ; the reduction of fare will be granted for both portions of the journey. Passengers on the H. & B. Railway will be allowed to break their journey at North Cave.

Permission to visit their estates is kindly granted by Colonel Broadley, Mr. C. E. G. Barnard, and Colonel Clitheroe. The Hull and Barnsley Railway Company have kindly granted permission to the members to inspect the Railway Cuttings at Cave.

BOOKS AND MAPS.—The district for investigation is comprised within Sheet 72 (94 S.W.) one-inch Ordnance Survey (which may be had geologically coloured. The following works may be consulted :—(1), The Memoir of the Geological Survey ; (2), Tate and Blake's Yorkshire Lias ; (3), William Hill, F.G.S., The Lower Chalk of Lincolnshire and Yorkshire ; (4), Alf. Harker, F.G.S., The Oolites of the Cave District (Naturalist,' May, 1885) ; (5) F. F. Walton, F.G.S., The Geology of the District between Market Weighton and the Humber ; (6) Rev. E. M. Cole, F.G.S., The Geology of the Hull and Barnsley Railway ; (7) Keeping and Middlemiss on New Sections at Cave (Geological Magazine, May, 1883).

ROUTES.—

I.—The Geological Party, under the leadership of Mr. F. F. Walton, F.G.S., President of the Hull Geological Society, will meet at North Cave Station at 11-3 a.m. Members arriving late are advised to proceed direct to the sections near South Cave Station.

II.—Under the leadership of Mr. J. F. Robinson and Mr. Chas. Waterfall, leave South Cave Station at 11-15 a.m. for Drewton Dale as far as St. Austin's Stone, then proceed to Weedley Springs, and along the path up the hill to Mount Airy and Wold Dale, returning by the main road to South Cave.

GEOLOGY.—This Section will be officially represented by its Hon. Secs., Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

Mr. J. W. Stather, F.G.S., writes as follows :—The geology of the Cave district is chiefly interesting from its comprising a wide range of formations in small compass. The Jurassic strata upon which South Cave is situated forms the strip of country, under three miles wide, between the Trias of the Plain of York and the Chalk Wolds. The beds, which include the Lower, Middle, and Upper Lias, Lower, Middle, and Upper Oolite, run roughly N.N.W. and S.S.E. and dip under the chalk in an easterly direction. Between North Cave and the village of Cliffe the Lower Lias forms a low escarpment, and the beds are well exposed in several marl pits on the road side. The fossils found here include *Lima gigantea*, *Cardinia listeri*, *Ammonites johnstoni*, *Pleuromya crowcombeia*, *Modiola minima*, *Ostrea*, &c. The Middle Lias is exposed in the neighbourhood of Hotham and North Cave, being cut into by the roads going up the bank E. of these places. The Lower Oolites of this district, which includes the Millipore or Cave Oolite, is well exposed at South Cave Railway Station. The fossils recorded are *Trigonia conjungens*, *Lima pectiniformis*, *Cricopora staminea*, &c. Of the Middle Oolites represented here, the Kelloway Rock is the most important member. It reaches a thickness of more than forty feet and is seen in fine section in the cutting E. of South Cave Railway Station. Fossils are very abundant, among which may be mentioned *A. modiolaris*, *A. kænigi*, *B. owenii*, *Gryphea bilobata*, *Avicula braamburiensis*, *Trigonia*, *Natica*, *Rhynchonella socialis*, &c. The Kimmeridge clay and red chalk can also be seen in the cutting, but for collecting purposes the red chalk sections on the hill side S. of the line are the best. The sections in the Lower and Middle Chalk near the Drewton Tunnel should also be seen, and St. Austin's Stone (a great mass of brecciated flint), at the head of Drewton Dale, is also worth a visit.

BOTANY.—The Botanical Section will be officially represented by its President, Mr. P. F. Lee, and two of its Hon. Secs., Mr. M. B. Slater, F.L.S., and Mr. Charles Crossland.

Mr. J. F. Robinson writes :—The route taken by the botanists will well repay investigation, as very many of the characteristic chalk-loving flowering plants are to be met with. Besides the wolds, the bottom of the dales, and the low-lying ground towards the Humber are rich in a varied flora. The following are a few of the species that have been noted by East Riding botanists :—*Papaver dubium*, *Alyssum calycinum*, *Reseda lutea*, *Helianthemum vulgare*, *Viola hirta*, *Saponaria officinalis*, *Astragalus glycyphyllos*, *Spiræa filipendula*, *Scleranthus annuus*, *Parnassia palustris*, *Œnanthe fistulosa*, *Carduus nutans*, *C. eriophorus*, *Centaurea scabiosa*, *Inula dysenterica*, *Campanula glomerata*, *Specularia hybrida*, *Monotropa hypopitys*, *Chlora perfoliata*, *Menyanthes trifoliata*, *Atropa belladonna*, *Scrophularia aquatica*, *Pinguicula vulgaris*, *Anagallis tenella*, *Centunculus minimus*, *Epipactis latifolia*, *Orchis pyramidalis*, *Ophrys apifera*, *Tamus communis*, *Eriophorum polystachyon* var. *latifolium*, *Carex divulsa*, *C. muricata*, *C. disticha*, *C. flava*, *C. vesicaria*, *C. ampullacea*, *Milium effusum*, *Apera spicaventi*, *Schlerochloa rigida*, and *Brachypodium pinnatum*.

Fungi.—The beech woods yield a considerable variety of fungi, some of which may be found at any visit during the year. *Boletus edule* is common, and so are many of the *Agarici*.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by its Hon. Secs., Messrs. Jas. Backhouse, F.Z.S., M.B.O.U., and Riley Fortune, F.Z.S.

Mr. F. Boyes writes :—The district to be investigated is a beautiful and very interesting one, and is generally characteristic of our chalk wolds. From the elevated portion near Drewton some fine views can be obtained of the Humber.

Birds.—The following birds breed in the district :—Kestrel, Sparrowhawk, Long-eared and Barn Owls, Spotted Flycatcher, Carrion Crow, Magpie, Bullfinch, Treepipit, Whinchat, Blackcap, Garden Warbler, Willow Wren, &c.

Mammalia.—Stoat, Weasel, Rat, Water Vole, &c.

Fishes.—Trout (Drewton Stream).

ENTOMOLOGY.—This Section will be officially represented by its President, Mr. James H. Rowntree, and its Hon. Secs., Messrs. A. E. Hall, F.E.S., and William Hewett.

Lepidoptera.—Messrs. M. Waller and J. W. Boult, of Hull, write :—The district to be visited is perhaps one of the most promising that could have been selected in the East Riding, as there are entomologists in Hull who can recollect many very rare insects being taken in Drewton Dale and neighbourhood. Of recent years, however, the district has not received much attention and it is not at all improbable that in some of the undisturbed parts many interesting insects which have been lost sight of still exist, as in fact has been found to be the case in one or two instances from investigations during the past summer. The following insects have been taken in the neighbourhood :—*Argynnis paphia*, *A. aglaia*, *A. euphrosyne*, *Colias edusa*, *Apatura iris*, *Satyrus semele*, *Hesperia linea*, *Procris geryon*, *Acherontia atropa*, *Chærocampa elpenor*, *Chelonia plantaginis*, *Selenia lunaria*, *Eurymene dolobraria*, *Geometra papilionaria*, and about fifty other species of Lepidoptera.

Coleoptera.—The district is one that promises well for the Coleopterist but has been very little worked. The aquatic species are conspicuous by their absence but such marsh-loving species as *Elaphrus* and *Dyschirius* are abundant. *Silpha thoracica* and *Necrophorus ruspator* are fairly abundant, and *Carabus catenulatus* and *C. monilis* have been obtained in numbers. The phytophagous species are fairly good and several good *Serricornia* are found

CONCHOLOGY.—The Conchological Section will be officially represented by its President, Mr. Wm. Nelson, and its Hon. Sec., Mr. F. W. Fierke.

Mr. Fierke, states that Drewton Dale is, conchologically speaking, a delightfully productive locality for so small an area. It may be considered one of those happy hunting grounds which naturalists never tire of, as there is always something to be found to instruct and interest them. There is such a diversity of conditions, parts exposed to all weathers, which, in dry seasons seem barren, but after showers, seem alive with the usual wold molluscan fauna, or, as at the bottom of the dales, sheltered by trees and brushwood the drought is never felt so keen and the *Hyaliniæ* and kindred forms more or less predominate at all times. Again there are numerous plantations in which the beech tree figures prominently (generally a good sign for conchologists) and the arboreal forms such as *Clausilia* and *Buliminus* hold almost undisputed sway, and, in the winding paths, skirted by a luxuriant growth of wild nettle and dock, the *Helices* occur in perhaps still greater variety and abundance. Another condition equally as interesting as any of those mentioned is that of the remains of a veritable old bog, known as Weedley Springs where the usual characteristic terrestrial marsh-loving species are to be met with. And, lastly, notwithstanding that the true aquatic mollusca as might be expected from the undulatory character of the district are only poorly represented, the isolated cattle ponds which occur at different places on the Wolds, present some important features to the student of distribution worthy of greater attention than they have so far received. Some forty species of terrestrial mollusca have been recorded in the immediate vicinity of South Cave, and eight aquatic species, and of the former the following may be more particularly mentioned as occurring more or less prolific. *Hyalinia pura*, *H. fulva*, *H. nitida*, *Helix pygmæa*, *H. aculeata*, *Helix hortensis* var. *lilacina*, *H. itala*, *Pupa muscorum*, *Vertigo antivertigo*, *V. pygmæa*, *Clausilia laminata*, and *Cæcilioides acicula*.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each
4-30 p.m.—Sectional Meetings
4-45 p.m.—General Meeting

} At the Fox and Corner Hotel, South Cave.

ON SATURDAY, AUGUST 4th,

The Members of the Hull Scientific Club and Hull Geological Society have arranged to hold an excursion to

SPURN POINT.

The party will leave Hull by train for Withernsea at 6-58, and thence proceed to Kilnsea near Spurn in waggonettes. Return fare for the whole journey 3/6.

The Geologists will alight at Out Newton, and proceed to examine the coast from that point southwards, under the leadership of Mr. J. W. Stather, F.G.S.

Any Members of the Union wishing to join the excursion will be cordially welcomed and should notify their intention to do so to F. W. Fierke, 52, Francis Street West, Hull, by Friday morning (3rd. Aug.).

Yorkshire Naturalists' Union.

President:

R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Ex-Presidents:

Rev. Wm. Fowler, M.A., Liversedge.
H. Clifton Sorby, LL.D., F.R.S., etc., Sheffield.
Prof. W. C. Williamson, LL.D., F.R.S., Manchester.
John Gilbert Baker, F.R.S., F.L.S., Kew.
Rt. Hon. Lord Walsingham, M.A., F.R.S., Thetford, Norfolk.
Rev. W. H. Dallinger, LL.D., F.R.S., etc., London.
Sir Ralph Payne-Gallwey, Bart, M.B.O.U., Thirkleby Park.
Wilfred H. Hudleston, M.A., F.R.S., Weybridge.
Henry Eeles Dresser, F.L.S., F.Z.S., London.
Rt. Rev. Wm. Walsham How, D.D., Lord Bishop of Wakefield.
Prof. A. H. Green, M.A., F.R.S., F.G.S., Oxford University.
Chas. P. Hobkirk, F.L.S., Dewsbury.
Henry Seebohm, F.L.S., F.Z.S., London.

Hon. Secretaries:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.
WALTER F. BAKER, F.E.S., Whitkirk, Leeds.

THE HUNDRED-AND-TWELFTH MEETING

WILL BE HELD AT

WHITBY,

For the investigation of the neighbourhood of

MULGRAVE WOODS,

ON MONDAY, SEPT. 3rd, 1894,

And will be followed by a

FUNGUS FORAY,

ON TUESDAY, SEPT. 4th, 1894.

☞ This Excursion is planned for two days, of which the principal one will be the first. Members not able to attend both days, and able to choose, are requested to attend on the Monday.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G.N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Whitby or Sandsend, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets will be available for return on the following day.

Members desirous of spending the week-end in the district, may book on the previous Saturday.

Members and Associates starting from stations which have not through booking arrangements, should book to the most convenient junction, and re-book to Whitby; the reduction of fare will be granted for both portions of the journey.

Members in other counties wishing to attend, should inform the Secretaries thereof, in order that the railway facilities may be obtained for them.

HOTEL ACCOMMODATION.—Members intending to stay the two days will find accommodation at the Station Hotel, Whitby.

Permission to visit their estates is kindly granted by the Hon. and Rev. Marquis of Normanby and Mr. J. Foster.

Members will do well to pay a visit to the Whitby Museum at West Pier. This Museum contains a very fine collection of fossils including the finest *Teleosaurus* yet discovered, and found in the Upper Lias at Saltwick.

BOOKS AND MAPS.—The district for investigation is included in Sheets 34 and 35 (formerly 104 S.E. and S.W.) also published geologically coloured. The 'Naturalist' for 1888 and 1889 contains records of work done in the district.

MYCOLOGISTS are cordially invited to visit Yorkshire and join in the investigations. The following gentlemen have already intimated their intention of being present:—Mr. George Massee, of the Royal Herbarium, Kew; Mr. Carleton Rea, M.A., B.C.L., of Worcester; and Messrs. Chas. Crossland, and M. B. Slater, F.L.S.

MONDAY'S PROGRAMME.—

Leaving Whitby Station at 9-30 a.m., and booking for Sandsend Station, the party will proceed direct to Mulgrave Woods.

FUNGUS SHOW.—

An exhibition of Fungi, at the Station Hotel, will be arranged on Monday evening, and remain open on Tuesday. Parcels of Fungi from other parts of Yorkshire will be very acceptable if packed in moss or bracken (not in paper), and sent so as to reach the Station Hotel by Monday afternoon. Localities to be stated. The Secretaries would be particularly glad to hear from members who intend to be present on Monday and are willing to assist in arranging the show.

Three lecturettes will be delivered during the evening. as follows:—

'James Bolton as a Mycologist,'
by Mr. Chas. Crossland;

'The Constancy and Relative Value of Specific Characters of Fungi,'
by Mr. Carleton Rea, M.A., B.C.L.;

'Economic uses of Fungi and Allied Organisms,'
by Mr. George Massee.

TUESDAY'S ROUTES.—

The mycologists will devote this day to the investigation of Arncliffe Wood.

GEOLOGY.—This Section will be officially represented by its President, Mr. Thomas Tate, F.G.S., and its Hon. Secs., Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

The members of this section will work along the coast to the north of Whitby.

In default of more recent information, we reproduce the paragraph written by the Rev. E. Maule Cole for the Whitby Meeting of 1885 :—Denudation, or in other words, rain and rivers, have excavated the dales of Cleveland as well as the valley of the Esk itself. The Kelloway rock once in all probability extended from Saltersgate and Simon Howe across to the Cleveland Hills, but it has now quite disappeared in the area between these points. The Lower Oolites form the top of the moorlands, but they too have been greatly denuded, and only a capping is left. The deep sides of the dales are excavated in Liassic rocks. As the dales are not obscured by boulder clay, they remain in the state impressed upon them by ordinary denudation. It is different with the Esk Valley ; there, as we learn from the official report of Mr. C. Fox-Strangways, the ancient valley has been filled with boulder clay, and the modern stream has cut its way, sometimes through this glacial debris, sometimes through the native rock, thus exposing good sections of the Lias. We have found the *pecten* bed well exposed in the Murk Esk just above Grosmont station. This is one of the two beds (*pecten* and *avicula*) which are worked for ironstone at Grosmont, and which belong to the *A. spinatus* zone of the Middle Lias, but, as Mr. Fox-Strangways thinks, at a lower horizon than the main seam of Cleveland.

On the coast a fault has let down the rocks on the west side of Whitby Abbey to a depth of some 150 feet. The Lias entirely disappears, and the sandstones of the Lower Oolites are only visible for a short distance from the west pier. Then to Sandsend (3 miles) the low cliffs are composed of boulder clay. At Sandsend the *A. communis* zone of the Upper Lias, which supplied formerly the alum of commerce, again forms the lower portion of the cliff, the top being capped with the Lower Oolites. Proceeding northward towards Kettleness, the *A. serpentinus* zone, which contains jet, is met with, rising in the cliffs ; then the *A. annulatus* zone, with numerous pyritous doggers, most of which contain the characteristic ammonite ; and, lastly, the *A. spinatus* zone, with its beds of ironstone and splendid pecten and belemnite fossils.

BOTANY.—The Botanical Section will be officially represented by its President, Mr. P. F. Lee, and its Hon. Secs., Mr. A. H. Pawson (Phanerogamic), Mr. M. B. Slater, F.L.S. (Cryptogamic), and Mr. Charles Crossland (Mycology).

The following plants have been recorded for the district :—*Corydalis claviculata*, *Cochlearia officinalis*, *Lychnis flos-cuculi*, *Malva moschata*, *Asperula odorata*, *Habenaria bifolia*, *Epipactis palustris*, *Luzula sylvatica*, *Scirpus pauciflorus*, *Eriophorum vaginatum*, *Carex remota*, *C. glauca*, *Drosera rotundifolia*, *D. longifolia*, *Solidago virgaurea*, *Antennaria dioica*, *Erythræa centaurium*, *Gentiana campestris*, *Bromus mollis*, *Melica uniflora*, *Anthoxanthum odoratum*, *Alopecurus geniculatus*, *Polystichum angulare*, and *Polypodium vulgare*. A full list of the plants known to occur in the district was published in the August and September numbers of the Naturalist for 1888.

Mr. M. B. Slater, F.L.S., writes as follows :—The fine shady glades of the woods at Mulgrave will most probably be a good hunting ground for the Fungi. It is also very good for the other sections of Crytogamic botany, as it abounds in Ferns, Mosses, and Hepatics. The showery weather during the month of August will have much assisted the growth of the autumnal species, and members studying this group will have the opportunity of gathering some interesting species of both Mosses and Hepatics. The following is a list of the kinds likely to be found in good fruiting condition at this season :—

Acrocarpous Mosses.—*Gymnostomum rupestre*, *Dichodontrum pellucidum*, *Dicranella squarrosa*, *D. varia*, *D. rufescens*, *D. heteromalla*, *Dicranum scoparium*, *D. majus*, *Didymodon rubellus*, *Trichostomum mutabile*, *T. tophaceum*, *Ditrichum homomallum*, *Barbula fallax*, *B. spadicea*, *Ulota bruchii*, *Tetraphis pellucida*, *Tetrodontium brownianum*, *Fissidens viridulus*, *F. adiantoides*.

Pleurocarpous Mosses. — *Isothecium myurum*, *Thamnium alopecurum*, *Leskea polycarpa*, *Pylaisia polyantha*, *Brachythecium plumosum*, *B. velutinum*, *Eurhynchium prælongum*, *E. swartzii*, *Rhynchosteguim ruscifolium*, *R. confertum*, *Hypnum purum*, *Thuidium tamariscinum*, *Hyocomium flagellare*, *Hylocomium triquetrum*, *Drepanium cupressiforme*, *Plagiothecium sylvaticum*, *Homalia trichomanoides*, *Neckera pumila*, *Pterygophyllum lucens*.

The district around Whitby is rich in rare Hepatics. Several interesting species of the following genera may be gathered :—*Jungermannia*, *Frullania*, *Lejeunea*, *Radula*, *Lepidozia*, *Cephalozia*, *Lophocolea*, *Chiloscyphus*, *Harpanthus*, *Kantia*, *Blepharozia*, *Blepharostoma*, *Scapania*, *Diplophyllum*, *Plagiochila*, *Nardia*, *Marsupella*, *Blasia*, *Pellia*, *Aneura*, *Metzgeria*, *Marchantia*, &c., &c.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by its President, Mr. J. Gerrard, M.B.O.U., and its Hon. Secs., Messrs. Jas. Backhouse, F.Z.S., M.B.O.U., and Riley Fortune, F.Z.S.

Not much systematic work has been done in this section, but the following birds have been noted :—Cormorant, Herring Gull, Rock Dove, Lesser Blackbacked Gull, Wheatear, Bunting, Cuckoo, Dipper, Magpie, Meadow Pipit, Pied Wagtail, Sedge Warbler, Willow Warbler, Song Thrush, Blackbird, Partridge, Redbreast, Lapwing, Corn Crake, Yellow Bunting, Blackcap, Whitethroat, Dunnock, White's Thrush, Waxwing, Wryneck, Pratincole, Creeper, and Little Bittern.

CONCHOLOGY.—The Conchological Section will be represented by Mr. Tom Petch, B.A.

The only records available for this section are those of the last meeting at Whitby, when the following were noted by Mr. W. Denison Roebuck, F.L.S. :—*Arion ater*, *Limax lævis*, *L. agrestis*, *Zonites cellarius*, *Z. radiatulus*, *Helix nemoralis*, *H. hortensis*, *H. arbustorum*, *Limax cinereo-niger*, *Clausilia laminata*, *Succinea elegans*, *Limnæa truncatula*, and *Pisidium pusillum*.

ENTOMOLOGY.—This Section will be officially represented by its President, Mr. James H. Rowntree, and its Hon. Secs., Messrs. A. E. Hall, F.E.S., and William Hewett.

The following are recorded for the district :—*Vanessa cardui*, *Furis brassicæ*, *Argynnis selene*, *Chortobius pamphilus*, *Thanaos tages*, *Strenia clathrata*, *Coremia propugnata*, *Lomaspilis marginata*, *Emmelesia albulata*, *Caberia pusaria*. *Melanippe montanata*, *Botys fuscalis*, *Chelonia plantaginis*, *Zygæna filipendulæ*, *E. rustica*, *Smerinthus populi*, etc.

PROGRAMME OF MONDAY'S MEETINGS.—

4-45 p.m.—Meat Tea, 2/- each
5-30 p.m.—Sectional Meetings
5-45 p.m.—General Meeting

} At the Station Hotel, Whitby.

Yorkshire Naturalists' Union.

President:

ROBERT BRAITHWAITE, M.D., F.L.S., London.

Ex-Presidents:

Rev. Wm. Fowler, M.A., Liversedge.
H. Clifton Sorby, LL.D., F.R.S., etc., Sheffield.
Prof. W. C. Williamson, LL.D., F.R.S., Manchester.
John Gilbert Baker, F.R.S., F.L.S., Kew.
Rt. Hon. Lord Walsingham, M.A., F.R.S., Thetford, Norfolk.
Rev. W. H. Dallinger, LL.D., F.R.S., etc., London.
Sir Ralph Payne-Gallwey, Bart, M.B.O.U., Thirkleby Park.
Wilfrid H. Hudleston, M.A., F.R.S., Weybridge.
Henry Eeles Dresser, F.L.S., F.Z.S., London.
Rt. Rev. Wm. Walsham How, D.D., Lord Bishop of Wakefield.
Prof. A. H. Green, M.A., F.R.S., F.G.S., Oxford University.
Chas. P. Hobkirk, F.L.S., Dewsbury.
Henry Seebohm, F.L.S., F.Z.S., London.
R. H. Tiddeman, M.A., F.G.S., H.M. Geol. Survey, Skipton.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

THE HUNDRED-AND-FOURTEENTH MEETING

WILL BE HELD AT

PICKERING,

For the investigation of the

HOLE OF HORCUM

AND THE

HEAD OF NEWTONDALE,

On MONDAY, May 13th, 1895.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Levisham or Pickering, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday, 10th May, will be available for return up to Tuesday, 14th May. The journey may be broken at Levisham or at Pickering.

HOTEL ACCOMMODATION.—Members will find accommodation at any of the Pickering Hotels.

BOOKS AND MAPS.—The district for investigation is included in Sheets 96 N.E. and 95 N.W., one-inch Ordnance Maps (also published geologically coloured. Reference may be made to Phillips' 'Illustrations of Yorkshire Geology,' to his 'Rivers, Mountains, and Sea-Coast of Yorkshire,' and to both editions of Baker's 'North Yorkshire.'

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines. Levisham station is just at the lower edge of the map, and Goathland station altogether out of it, about 2½ miles north. There is no station between.

ROUTES.—Two lines of route have been arranged, viz. :—

I.—The Geological party will be under the leadership of Rev. E. Maule Cole, M.A., F.G.S., and Mr. S. Chadwick, F.G.S.

II.—Naturalists in general will devote themselves to the examination of the Head of Newtondale, *north* of Levisham. Messrs. J. Braim, M. B. Slater, &c., will lead. Distance optional.

Both parties will leave Levisham station at 11-21 a.m.

Permission to visit their estates is kindly granted by Mr. J. W. Wheldon, Mr. Mitchelson, and other land-owners and shooting-lessees in the district.

GEOLOGY.—The Geological Section will be officially represented by its President, Mr. S. Chadwick, F.G.S., and one of its Secretaries, Rev. W. Lower Carter, M.A., F.G.S.

The Rev. E. Maule Cole, M.A., F.G.S., writes that the tabular hills of Middle Oolites, which bound the Vale of Pickering on the north, slope gently upwards from the plain, but their northern face is remarkably precipitous. Notwithstanding

this, they are cut through in many places, at right angles, by streams originating in the moorlands beyond. This fact alone proves that the Middle Oolites once extended right up to the anticlinal running east and west from Burton Head to Robin Hood's Bay. Their northern face is receding owing to sub-aërial denudation. After the removal of the Middle Oolites, the rainfall attacked the then exposed beds of the Lower Oolites, and carved out the comparatively broad dales of Rosedale, Bransdale, etc., down to the Middle Lias; but the streams, once originated, kept their old course throughout the process, for rivers are invariably older than hills, and, as the land rose, simply but persistently cut deeper, and formed the picturesque gorges which may be seen at Helmsley, Kirkby Moorside, Sinnington, Pickering, and Ayton. Of all these gorges, none are more beautiful than that of Newtondale. In its lower portion it shares its charm with the above-named ravines, but in its upper portion it is unique, for it has been excavated in hard beds of the Kelloways Sandrock, and, while contracted in width, presents perpendicular cliffs on either side, towering some 150 feet above the stream below. Anyone climbing out of the cañon, for such it is on a small scale, will find himself on a level platform of Kelloways Sandstone, on which is built up a second sloping cliff, consisting of Oxford clay capped with calcareous grit. Near Saltersgate, this latter elevation attains a height of 900 feet at Winny Neb, and from it a magnificent prospect is revealed, from Flamborough Head on the south-east to the Hambleton Hills on the west. Close at hand, some two miles distant, is the conical hill called Blakey Topping; this is an outlier of Middle Oolites, left standing up some 200 ft. above the general plain. As a contrast, close by, is the Hole of Horcum, an inlier—that is to say, its bottom is composed of Kelloways Sandstone, similar to the northern platform, whilst its steep sides consist of Oxford clay and calcareous grit. It opens out southwards, but its northern edge is only a few yards wide, so that in process of time we may expect that this ridge will be cut through by the rainfall and a continuous valley formed instead of the present Hole.

BOTANY.—The Botanical Section will be officially represented by its Secretaries, Messrs. A. H. Pawson, and M. B. Slater, F.L.S., and the Mycological Committee by its President, Rev. W. Fowler, M.A.

Mr. M. B. Slater writes that the route of the excursion is almost entirely through a moorland tract. Vegetation is late this season, consequently very few flowering plants will be seen in flower so early in such an exposed district. We may name the following plants, all of which occur on the adjoining moors: *Erica tetralix*, *E. cinerea*, *Calluna*, *Vaccinium myrtillus*, *V. vitis-idea*, *V. oxycoccus*, *Empetrum nigrum*, *Trientalis*, *Myrica*, *Digitalis*, *Pinguicula*, *Drosera rotundifolia*, *Genista anglica*, *Prunus padus*, *Pyrus aucuparia*, and the rare *Cornus suecica*. This latter plant is found abundantly in some parts of the highlands of Scotland, and in the northern parts of arctic Europe; it has its southern limit in the British Islands upon this moorland ridge, and does not extend to the moorlands on the west side of the Vale of York. It does not flower until after mid June, and is generally seen in finest condition about the longest day, June 21st.

Rev. W. C. Hey adds that *Trollius* and *Polypodium dryopteris* are the only plants he has particularly noted in the area marked out.

Mosses and Hepatics.—Mr. M. B. Slater writes that the district being almost entirely uncultivated, is rich in cryptogamic vegetation. In more fertile lands these minute plants get exterminated by the cultivation of the cereals and other farm produce. In the bogs on the moors *Sphagnum* moss abounds, and some rare species of **Mosses** belonging to the following genera are to be met with, while some of the spring fruiting kinds may be got in good condition. *Gymnostomum*, *Leucobryum*, *Seligeria*, *Bryacyodus*, *Ditrichum*, *Grimmia*, *Rhacomitrium*, *Ulota*, *Orthotrichum*, *Entosthodon*, *Bartramia*, *Philonotis*, *Webera*, *Bryum*, *Mnium*, *Tetrodontium*, *Atrichum*, *Polytrichum*, *Pterygophyllum*, *Thuidium*, *Climacium*, *Isothecium*, *Camptothecium*, *Brachythecium*, *Eurhynchium*, *Rhynchostegium*, *Amblystegium*, *Hypnum*, *Hyocomium*, etc. In the damp hollows on the moors, and in sheltered places by stream-sides, many **Hepaticæ** grow abundantly, and some of the rarer species in the following genera may be collected, many of them fruiting at this season: *Marchantia*, *Preissia*, *Conocephalus*, *Lejeunea*, *Frullania*, *Radula*, *Lepidozia*, *Cephalozia*, *Lophocolea*, *Kantea*, *Scapania*, *Mylia*, *Jungermania*, *Nardia*, *Aneura*, *Metzgeria*, etc.

Of **Lichens, Fungi,** and **Algæ** there appear to be no records.

VERTEBRATE ZOOLOGY.—Mr. John Braim writes that the Peregrine Falcon and Raven have bred regularly in Newtondale since he can remember. The

*Merlin, *Kestrel, and *Sparrow-hawk breed every year, while the Buzzard and Hen Harrier did so in former times. He has one of three eggs of Montagu's Harrier which were taken out of a nest in the vicinity. The following birds are residents or visitors :—*Long-eared and *Tawny Owls, Great Grey Shrike, *Pied Flycatcher, *Dipper, *Ring Ouzel, Stonechat, *Long-tailed Tit, *Pied and Grey Wagtails, Snow Bunting, Black-headed Bunting, Twite, *Green and Great Spotted Woodpeckers, *Kingfisher, *Nightjar, *Stock Dove, *Red Grouse, *Golden Plover, Dotterel, *Curlew, Redshank, *Snipe, Woodcock, Spotted Crake, Mallard, Teal, and Black-headed Gull, besides the commoner species of the moorlands.

Mr. J. W. Wheldon notes that the Heron occasionally nests in Kingthorpe Wood and the Twite on Saltersgate Brow ; also that his sons have found between Pickering and the north end of Newtondale the eggs of all the birds marked with an asterisk in Mr. Braim's list, as well as of the Spotted Flycatcher, Missel and Song Thrushes, Blackbird, Hedge Accentor, Robin, Redstart, Wheatear, Whitethroat, Garden Warbler, Blackcap, Willow Warbler, Chiffchaff, Goldcrest, Wren, Creeper, Great, Blue, Cole and Marsh Tits, Tree and Meadow Pipits, Skylark, Chaffinch, Tree and House Sparrows, Greenfinch, Lesser Redpoll, Linnet, Bullfinch, Starling, Carrion Crow, Rook, Jackdaw, Magpie, Jay, Cuckoo, Swallow, House and Sand Martins, Swift, Pheasant, Partridge, Peewit, Sandpiper, Water Rail, Moorhen, Grasshopper Warbler, and Lesser Whitethroat.

Of **Mammals,** Mr. Braim has noted the Fox, Stoat, Weasel, and Water Vole ; of **Reptiles,** the Adder and Common Lizard ; and of **Fishes,** the Trout, which is common in the streams. Mr. J. W. Wheldon notes also the Grayling, Minnow, Loach, and Millers'-thumb.

CONCHOLOGY.—There are no mollusca whatever on record for the area of the present excursion, but the district is a promising one, and conchologists who will work their way up the stream-side, from Levisham Station northwards, may be encouraged by the remembrance of the great success of the Union's former visit to the district in 1886, when the valley was explored southwards from Levisham.

ENTOMOLOGY.—The Entomological Section will be officially represented by its President, Rev. W. C. Hey, M.A., and its Secretaries, Messrs. A. E. Hall, F.E.S., and W. F. Baker, F.E.S.

Lepidoptera.—Mr. Braim has noted *Thecla rubi* and *Chortobius davus* in the upper part of Newtondale. No other records appear to be available.

Coleoptera.—Rev. W. C. Hey, M.A., writes that the whole of this moorland waste is productive of Coleoptera. The sandy roads have yielded such species as *Pterostichus vitreus*, *P. æthiops*, *Carabus nitens*, and *C. arvensis*. The mossy pools (which are however few in number and dry up before summer) yield abundance of *Hydropori*, especially *H. melanarius*, *H. tristis*, and *H. gyllenhalli*. If the weather is sunny, great numbers of beetles may be taken on the wing, especially *Lochmæa capreæ* and species of *Aphodii*. The thick moss which grows among the heather is very rich in insects, yielding *Calathus*, *Ocypus*, *Myrmedonia*, *Bradycellus*, and many other genera.

Other Orders.—Nothing known, but specimens collected may be sent to Messrs. G. T. Porritt, F.L.S., Crosland Hall, Huddersfield, (Neuroptera, Trichoptera, or Orthoptera), and R. H. Meade, 1, Mount Royd, Manningham, (Diptera), or P. H. Grimshaw, F.E.S., Edinburgh Museum of Science and Art, (Diptera).

PROGRAMME OF MEETINGS.—

3-52 p.m.—Train leaves Levisham for Pickering.

4-5 p.m.—Meat Tea, 2/- each
5-0 p.m.—Sectional Meetings
5-30 p.m.—General Meeting

} At Longhorn's Black Swan Hotel, Pickering.

NOTE.—At Pickering Mr. Thos. Mitchelson will be pleased to allow members to visit his private Museum of Antiquities and Natural History, and Mr. J. W. Wheldon will be glad to explain his system of fish-hatching.

ANNUAL MEETING.—The York Society will on this occasion have a series of Exhibits in the Museum to illustrate the work done by the Union and all its Sections, Committees, and Members during the season of 1895 ; and they hope to rely on all workers to support them in making a successful display.

Yorkshire and Lincolnshire Naturalists' Unions.

Hon. Secretaries:

Rev. E. ADRIAN WOODRUFFE-PEACOCK, Cadney Vicarage, Brigg.
WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

A JOINT MEETING will be held at BRIGG

For the investigation of

BROUGHTON WOODS

AND

TWIGMOOR GULLERY,

On WHIT-MONDAY, June 3rd, 1895.

PRECEDED BY A VISIT TO

GOOLE MOOR, SATURDAY, June 1st.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Brigg to Members and Associates of the Y.N.U. and L.N.U. producing their signed card of Membership. Tickets taken on Friday, 31st May, will be available for return up to Tuesday, 4th June. The journey may be broken at Appleby.

BOOKS AND MAPS.—The Geological and Drift Maps, with the explanation of sheet 86—North Lincolnshire—and the Six-inch Ordnance Maps of the district, will be exhibited in the dining-room at the Angel Hotel, both before and after the meeting in the woods.

Permission to visit their estates is kindly granted by Lord Yarborough, Lord St. Oswald, Mr. R. N. Sutton-Nelthorpe, Mr. Max H. Dalison, Major Spencer Chichester, and Mr. H. R. Dudding.

No eggs of any birds whatever are to be taken by naturalists in the woods or on the commons. Game birds' and wild fowls' nests are to be carefully avoided for fear "of making them forsake."

ROUTES.—All parties will drive: carriage fare, 1/3 each for the return journey. The main bodies start from the Angel Hotel, Brigg, at 10 a.m. Supplementary ones from the railway station at 11 and 12 a.m.

I.—Geologists and Vertebrate Zoologists under Mr. F. M. Burton, F.L.S., F.G.S.—Gull Pits, Sweeting Thorns Wood, Low Wood, Manby Hall, Woods north and east of the Hall, and back to Entrance Lodge to Manby where Ermine Street cuts the Brigg and Raventhorpe Road.

II.—Conchologists, under Mr. John Beaulah—Gull Ponds, High Wood, Scawby Park and Woods, and back to meeting place by Broughton Lane Plantation.

III.—Botanists, under Rev. E. A. Woodruffe-Peacock—Gull Pits, Twigmoor and Manton Common, then due north through High, Manby, West and Heron Woods, through Far Wood to the Quarry, and back to the meeting place by the Ford and Ermine Street.

Entomologists should divide themselves equally with the three parties, Lepidopterists consulting Mr. Charles Holgate, J.P., Coleopterists Mr. John Beaulah.

The Map is divided into square miles by horizontal and perpendicular lines.

GEOLOGY.—The Rev. E. A. Woodruffe-Peacock writes :—The ground is not very interesting for geologists, as for the most part it is covered with Post-Glacial and Recent deposits. Brigg, east of the Ancholme, stands on Oxford Clay (*Gryphæa dilatata*; *Modiola bipartita*; *Nucula ornata*; and *Ammonites biplex*), but it is entirely covered by Glacial Gravel (well-worn flints, associated with sand). On the west of the River Ancholme peat and alluvium, in layers of varying thickness, stretch north and south for miles. Immediately after crossing the second bridge from Brigg, over the New River, Boulder Clay (full of chalk fragments) appears for half-a-furlong. This in turn is succeeded by two or three furlongs of Ponton Beds (or more properly Hibaldstow Beds, as the characteristic fossiliferous Ponton Oolite cannot here be identified, though this bed is rich in fossils; *Turbo oppellensis*, sinistral sp.; *Pholadomya fidicula*, very rare; *P. heraultii*, common; *Trigonia hemisphærica*, dwarf variety; *Lima pectiniformis* Schloth.; *Ostrea gregaria*, common; *Cidaris* and *Echinus*, rare; *Corals*, obscure); and the Thirton Beds of the Inferior Oolite (*Terrebratula globata; T. maxillata; Lucina bellona; Pecten lens*; *P. annulatus; P. aratus*; *Lima duplicata; Corbis lajoyei* var. *cingenda;* with small fragments of *wood*, and traces of plants, which cannot be identified, and *Serpula*). Broughton Lane Plantation—the best ground for conchologists hunting for living specimens—stands on this strata, with the exception of Bracken Hill, where the Broughton and Scawby Road cuts the Brigg and Manby Road, which is upon Hibaldstow Beds. After crossing the Roman Road (Ermine Street) blown sand covers the whole district with the exception of a little glacial gravel just above the escarpment. This is followed on the hill-side by the Lower Estuarine Beds (*Galeropygus agariciformis; Corbis rotunda*; *Modiota sowerbyana; Pholadomya*

heraultii) of the Inferior Oolite. North of the road east of Manby Hall, but west of the point we have reached, we have the successive out-cropping, above the blown sand, of Clay and Shale of the Upper Lias (*Lima pectinoides*; *Myacites unioides?*; *Eucyclus imbricatus*; *Terebratula punctata*; *Ammonites communis*; *A. semicelatus*; *A. elegans*); the Marlstone (Rhychonella Beds, containing *Ammonites communis*; *A. cornucopia*; *A. serpentinus*; *A. spinatus*; *Belemnites paxillosus*, large; *Terebratula sub-punctata*; *Avicula cygnipes*; *Myacites unioides*; and *Spiriferina*, very rare); and Pecten-bed (Ironstone) of the Middle Lias (*Ammonites armatus*; *A. henleyi*; *Belemnites elongatus*; *Tancredia liassica*; *Unicardium cardioides*; *Goniomya*, very rare. The clays of the Lower Lias (and Frodingham Ironstone)—a magnificently rich fossiliferous bed. Ironstone was worked in very ancient times at Manton and Twigmoor; and the road at the hill-foot mended with old scoriæ when I was a lad. The remains of these old smeltings can still be seen on Manton Common.

BOTANY.—The Rev. E. A. Woodruffe-Peacock writes—the Appleby, Broughton, Manton, Raventhorpe, Scawby, and Twigmoor woods, commons, ponds, bogs, 'dampt spots,' and ditches are, when the number and the rarity of some of the species are taken into account, the richest botanical ground in Lincolnshire, and have been the happy hunting-ground of botanists for over a hundred years. The following is a concise list of the rarer conspicuous species to be found in Broughton parish, or just by in a neighbouring locality when the initial letter of the place in question is given in brackets. The bot. secretary of the Lincs. Union would take it as a great kindness if members of the unions, finding species marked with an asterisk, would hand over specimens to complete the now almost perfect County Herbarium under his care:—**Anemone pulsatilla*, *Aquilegia vulgaris*, **Cardamine flexuosa*, *Viola palustris* (A.T.M.), *V. riviniana*, and its variety *V. flavicornis* of Forster, not Smith; **V. stagnina*, I have never seen a specimen (M.). Would all botanists look out, especially in the long grass and rushes of the damper spots (T. & M.) for a curious *Viola palustris* (with leaf petiole, 4—6 inches). Mr. W. H. Beeby, the specialist, wants specimens with flowers and roots. *Saponaria officinalis*, *Silene noctiflora*, **Stellaria nemorum*, *Hypericum montanum*, *Geranium sanguineum*, *Erodium cheerophyllum*, *Oxalis acetosella*, *Rhamnus catharticus*, *Genista anglica* (R), *Astragalus hypoglottis*, *A. glycyphyllus*, *Hippocrepis comosa*, *Prunus fruticans*, i.e., *P. macrocopa*, of the ninth ed. of Lond. Cat.; *Rubus suberectus*, *R. saxatilis*, *Rosa* sps., *Sedum rhodiola*, *S. telephium*, **Drosera*, all three species were found a few years ago on Manton—extinct? *Lythrum*, *Epilobium* sps., **Myrrhis odorata*, **Selinum carvifolia*; the Rev. W. Fowler added this species to the *Brit. Flora* from a spot in Broughton Wood, where it is a native. **Asperula cynanchica*, *Valeriana mikanii*, *V. sambucifolia*, *Solidago virgaurea*, *Erigeron acre*, **Antennaria dioica*, *Carlina vulgaris*, *Serratula tinctoria*, *Lactuca muralis*, *Campanula glomerata*, *C. trachelium*, *C. latifolia*, *C. rotundifolia*, *flore albo* (A), *Campanula latifolia* × *trachelium*, the only known record for hybrid; *Specularia hybrida*, **Primula acaulis* of Jacq., with rudimentary scape; *P. vulgaris* × *veris*, sometimes this hybrid is found with true *vulgaris* and *vulgaris* × *veris* flowers on one root; *Lysimachia nemorum*, **Anagallis pallida* (S.), **A. tenella*, *Gentiana pneumonanthe*—these last two, I fear, are extinct (M & T.); *Polemonium cæruleum*, *Cynoglossum officinale* (M.), *Myosotis collina*, *Lithospermum officinale*, *L. arvense*, *Hyoscyamus*, *Verbascum thapsus**, *Veronica montana* in wet places in the wood, *Melampyrum pratense*, **Pinguicula vulgaris* (M.)—extinct; *Origanum vulgare* and *flore albo*, *Calamintha clinopodium*, *C. arvensis*, *Nepeta cataria*, **Galeopsis ochroleuca* (T.), *Lamium galeobdolon*, *Teucrium chamædrys*, denizen, perhaps extinct during the last two years; *Myrica gale* just out of flower; *Ophrys apifera*, **O. muscifera*, a rare species here, *Habenaria conopsea*, *H. chloroleuca*, *Convallaria majalis* by millions, **Allium oleraceum*, *Ornithogalum umbellatum*, alien; *Paris*, *Luzula pilosa*, *Eleocharis palustris*, **Scirpus caricis*, *Eriophorum angustifolium*, **Rynchospora alba* (T.), **Cladium germanicum* (M.), **Carex pulicaris*, *C. ligerica*, very rare indeed; **C. echinata* (B. & T.), *C. acuta*, *C. pallescens*, **C. fulva*, *C. lepidocarpa*, *C. rostrata*, *C. vesicaria*, *Calamagrostis epigeios*. This list owes its fulness to the Rev. W. Fowler's notes, made almost yearly since 1855.

Mosses and Hepatics.—Mr. J. Larder writes that the following amongst others have been found in the district to be visited:—*Sphagnum cuspidatum*, *S. intermedium*, *S. cymbifolium* and var. *squarrosulum*, *Dicranum palustre*, *Leucobryum glaucum*, *Barbula tortuosa* (Broughton), *Webera annotina*, *Bryum nutans*, *Aulacomnium palustre* var. *imbricatum*, *Neckera crispa* (Broughton), *Plagiothecium undulatum* (in considerable abundance in the Brigg district in pre-historic times, "Naturalist," Jan. 1889, page 4), and *Pellia epiphylla*.

Lichens and Algæ.—Very few records of former and none for latter.

Fungi.—The Rev. E. Adrian Woodruffe-Peacock writes that the following short list of common things is all he has by him: *Boletus luteus* (T)., *Agaricus rutilans* (T)., *Ag. fascicularis* (T)., *Ag. clypeatus* (B)., *Æcidium berberidis* Pers. (A)., *Hygrophorus obrusseus* (T)., *Marasmius oreades* (T)., *Hygrophorus conicus* (T)., *Phallus fesculentus* (B)., *Puccinia scorodoniæ* (S)., *Scleroderma verrucosum* (T)., *Polyporus abietinus* (B). The woods want thoroughly working in September.

VERTEBRATE ZOOLOGY.—

Mr. John Cordeaux, M.B.O.U., writes that the locality chosen for the Excursion is the best ornithological district in the county of Lincoln. The Gull Ponds of Twigmoor are not surpassed in any other place in England. There was a Heronry in Broughton Wood, which in 1881 contained twenty nests. It is now in Appleby Wood to which the birds removed after the felling of some large timber. The Commons and the Woods are the nesting-places of the Wheatear, Stonechat, Redstart, Lesser Whitethroat, Garden-Warbler, Blackcap, Nightingale, Wood-Warbler, the Tits, Nuthatch, Tree-Creeper, Redpoll, Wood Lark, Goatsucker, Woodpeckers, the Long-eared, Tawny, and Short-eared Owls, Sheld-drake, Shoveller, Wild Duck, Teal, Stock-Dove, Turtle-Dove, Stone-Curlew, Woodcock, Snipe, Redshank, Corn Crake, Spotted Crake, Water Rail, Coot, Little Grebe, and many other species. The nests of the Golden Oriole, Pied Flycatcher, and Black Redstart, have been found in the neighbourhood, and within a few miles of Twigmoor the Ruff, Wood-Sandpiper, and Dunlin have nested within recent years.

It is earnestly requested that the breeding birds shall be as little disturbed as possible, and the nests and eggs protected.

CONCHOLOGY.—Mr. John Beaulah says that the best ground for Conchologists to work is the Wood Lane or Burton Lane Plantation, which is about a mile west of Brigg, and extends for about a mile on the road from Brigg to Ashby. Here nearly all the British woodland species of Mollusca may be found. For water shells it will be found necessary to search the ponds and ditches of the neighbourhood of Brigg itself.

ENTOMOLOGY.—There appear to be no records of insects for the district except for

Lepidoptera, of which a list is given by Mr. Charles S. Holgate, J.P., including *Rhodocera rhamni*, *Leucophasia sinapsis*, *Pyrarga egeria*, *P. megæra*, *Epinephile hyperanthus*, *E. tithonus*, *Thecla quercus*, *Nemeobius lucina* (Manby Wood), *Argynnis euphrosyne*, *Hesperia malvæ*, *Smerinthus ocellatus*, *Chærocampa porcellus*, *Zygæna trifolii*, *Z. loniceræ*, *Euthemonia russula*, *Chelonia plantaginis*, *Gonophora derasa*, and many others. The district is a most fruitful one, and ought to yield the Entomologists a rich harvest in all orders.

PROGRAMME OF MEETINGS.—

3-45 p.m.—Carriages, Manby Wood, Entrance Lodge.
4-30 p.m.—Meat Tea, 2/- each } At the Angel Hotel, Brigg.
5-0 p.m.—General Meeting }

Goole Moor to Crowle, Saturday.—Trains reach Goole from Hull at 10.43 a.m.; from L. & Y. Stations 10.35 a.m.; and from Doncaster 11.10 a.m. At last-named hour Mr. Thos. Bunker will lead a party from Goole Station up the bank of one of the warping drains to the moor, visit the most convenient portions, and arrive at Crowle in time for tea and trains either home or forward to Brigg. Plants and animals which still occur on Goole Moor (which is being rapidly cut up by the Peat Moss Litter Companies, and will in a year or two cease to exist as a moor) include the following:— **Plants**—*Caltha*, *Drosera* (3), *Stellaria glauca*, *Rhamnus catharticus*, *Epilobium hirsutum*, *E. angustifolium*, *Lythrum salicaria*, *Apium graveolens*, *Sium latifolium*, *Œnanthe*, *Aster tripolium*, *Erica tetralix*, *Calluna*, *Andromeda*, *Empetrum*, *Listera cordata*, *Orchis morio*, *Typha*, *Narthecium*, *Eriophorum*, *Lastræa filix-mas*, *Athyrium filix-fæmina*, *Blechnum*, *Osmunda*, and *Ophioglossum*, &c. *Claytonia perfoliata* and *Peucedanum palustre*, on the Thorne Side. **Mammals**—Fox, Hare, Rabbit, Stoat. **Birds**—Curlew, Owl, Nightjar, Snipe, Black-headed Gull, Peewit, Wild Duck, Teal, Redshank, &c. **Reptiles**—Adder, Grass or Common Snake, Lizard. **Fishes**—Eels, Pike. **Lepidoptera**—*Chortobius davus*, *Saturnia carpini*, &c.

Yorkshire Naturalists' Union.

President:

ROBERT BRAITHWAITE, M.D., F.L.S., London.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

THE HUNDRED-AND-SIXTEENTH MEETING

Will be held at

FLAMBOROUGH,

On SATURDAY, June 29th, 1895.

EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Filey, Speeton, Bempton, Flamborough, or Bridlington, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Thursday, June 27th, will be available for return any day up to Monday, July 1st. The journey may be broken at any of the stations mentioned.

HOTEL ACCOMMODATION.—Members will find accommodation at any of the hotels at Flamborough or Bridlington Quay.

BOOKS AND MAPS.—The district for investigation is included in Sheets 55 and 65 (formerly 95 S.E. and 94 N.E.), one-inch Ordnance Maps (also published geologically coloured). Reference may be made to Phillips' 'Illustrations of Yorkshire Geology,' to his 'Rivers, Mountains, and Sea-coast of Yorkshire,' and to both editions of Baker's 'North Yorkshire.' The Rev. Robert Fisher's 'Handbook to Flamborough Village and Headland' (1894) price 1/- paper, 3/6 cloth, containing a large amount of information on all branches of natural history (Mr. Matthew Bailey's chapter on birds being particularly useful) is indispensable.

THE YORKSHIRE GEOLOGICAL AND POLYTECHNIC SOCIETY hold their Summer Excursion at Filey, on Thursday and Friday, June 27th and 28th, and will unite in the excursion to Flamborough. Any member of the Y.N.U. who would like to join in the Y.G. & P. Excursion can obtain full particulars on application to the hon. sec., Rev. W. L. Carter, Hopton, Mirfield.

SATURDAY'S ROUTES.—The trains leaving Scarborough at 8-30 a.m. and Bridlington at 9-22 a.m. will be specially stopped at Bempton Station for Routes I. and II.

I.—Geologists will start from Bempton Station, at 9-30 a.m., under the leadership of the Rev. W. L. Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S., and make their way to Old Dor. Thence the cliff path will be followed to the North Landing and on to the Lighthouse. Members arriving by later trains should take the same route and meet the main party at North Landing.

II.—Ornithologists and others wishful to see the birds on Buckton and Bempton Cliffs, and to watch the 'egg-climmers,' will alight at Bempton station.

III.—Botanists and naturalists generally will find the Dane's Dyke, a sheltered locality, perhaps the best field of investigation. The depressions on the coast formed by land-slips will also be found productive for botanists and others.

IV.—Marine Zoology.—The excursion is particularly intended for the investigation of the littoral fauna at the South Landing (square C 4 on map) under the direction of Mr. J. Darker Butterell.

Low Tide on Friday, 28th, about 2-30 p.m. ; on Saturday, 29th, about 3-15 ; and on Sunday, 30th, about 4 p.m.

The Rev. Robert Fisher, M.A., and Mr. Matthew Bailey will take part in the excursion. Members intending to avail themselves of Routes III. and IV. will be met at Flamborough Station on the arrival of all the trains between 9-6 a.m. and 12-34 p.m., and receive full directions.

Permission to visit their estates is kindly granted by Miss Cottrell-Dormer and Mr. Yarburgh G. Lloyd-Greame.

GEOLOGY.—The Geological section will be officially represented by its President, Mr. S. Chadwick, F.G.S., and its Secretaries, Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

The Rev. W. Lower Carter, M.A., F.G.S., writes :—The beds to be examined during the excursion are the Middle Chalk with flints, which forms the mass of the cliff from Buckton to Selwicks, and the Upper Chalk without flints which begins to come in at the Lighthouse and forms the cliffs on the Bridlington side of the headland. Capping these are a series of glacial beds, consisting of a broad ridge of gravels and boulder clays. These are shown in fine sections along the coast-line between the Lighthouse and Bridlington, and consist near Sewerby of two or three bands of boulder clay, separated by stratified deposits, and overlaid by a considerable thickness of chalky gravel (the Sewerby gravels). These beds have been very completely described by Mr. G. W. Lamplugh, F.G.S., in Q.J.G.S., xlvii., 384. At Old Dor the chalk is thrown into magnificent folds from the top to the bottom of the cliff, 275 feet in height. The cliffs between Bempton and Thornwick Bay are almost vertical, and give beautiful examples of all the stages of marine denudation. At Thornwick Bay the chalk is worn into picturesque pinnacles and arches, and a series of fine caves has been worn out by the force of the waves. In the centre of Selwicks Bay, there is 'a fault in the chalk, accompanied by much contortion and the formation of veins of calcite in the shattered rock.' This fault brings down the Upper Chalk into the cliffs for a short distance. Near the Lighthouse there are two large crater-like hollows, which result from a couple of caves having penetrated into

an old pre-glacial ravine in the chalk filled with drift, the loose deposits having been gradually withdrawn by the waves. The drift beds below the Lighthouse are largely composed of masses of Speeton Clay, Kimmeridge Clay, Red Chalk, etc., and the characteristic fossils of these formations can be obtained in considerable numbers.

BOTANY.—The Botanical Section will be officially represented by its Secretaries, Messrs. A. H. Pawson, and M. B. Slater, F.L.S., and the Mycological Committee by its President, Rev. W. Fowler, M.A.

Mr. J. Frazer Robinson (Hull) writes that in **Phanerogamia** the list made by the Y.N.U. in 1886, and incorporated in 'Flamborough Village and Headland,' is fairly comprehensive. *Ranunculus hederaceus*, *R. hirsutus*, *Menyanthes*, *Triglochin maritimum*, and *Carex distans*, may be added as found by members of the Hull Scientific Club. In **Marine Algæ** there is a rich field in the various 'wicks' (bays) of the headland. Besides the commonest, still beautiful and interesting, forms which alone are mentioned by Mr. West in the guide book, they have noted the less common *Laminaria fascia* and *Alaria esculenta* in Thornwick Bay and at North Landing near Robin Lyth's Hole (Cave, see 'Mary Anerley,' by Blackmore). *Enteromorpha pellucida* and *Porphyra vulgaris* are also frequent. Three of the beautiful *Delesseriæ* are to be found, viz., *D.* (*Maugeria*) *sanguinea*, *D. alata*, and *D. ruscifolia*. There are two or three distinct varieties of *Rhodymenia palmata*, with *R. ciliata*. *Laurencia cæspitosa* (Pepper dulse) is as common or commoner than *Chylocladia articulata*. *Ptilota plumosa* is rare at Flamborough. *Griffithsia setacea* is sometimes cast up.

The Rev. Robert Fisher, M.A., writes that the date is early for this district. It would be the best plan to work from the road at Marton by the old fish ponds to the southern end of the Dane's Dike, and work northwards along it as far as time allows. No complete list of the flora has been published, and it would be useful to thoroughly investigate the parts named as a contribution towards that end. Some of the best phanerogams of the district have disappeared owing to drainage and cultivation. The best ones he has found are mentioned in 'Flamborough Village and Headland.' It is to be hoped that some botanists will follow other parties, so that a full list may be obtained for the whole district.

VERTEBRATE ZOOLOGY.—The Vertebrate Section will be officially represented by one of its Secretaries, Mr. Thomas Bunker.

Birds.—Mr. Matthew Bailey's full list in Mr. Fisher's book on Flamborough should be referred to.

Mr. F. Boyes writes that Flamborough Head with its famous sea-cliffs is at all times interesting to the naturalist, and during the summer months when the sea-fowl are breeding there it is particularly so. The 'sea-birds' of Flamborough practically consist of three species: the *Guillemot*, locally called 'Skoot,' the *Razorbill*, called 'Auk,' and the *Puffin*, known as the 'Sea-Parrot'—their numbers are simply incalculable. A few Kittiwake Gulls nest there, and of late years they have increased considerably. A few pairs of Herring Gulls also breed on the cliffs, chiefly near Filey. No other sea-birds breed there, but the cliffs afford nesting sites for a number of so-called land-birds, chief amongst which are the Rock-Dove and Stock-Dove—the former seems to be giving way to the Stock-Dove. Many Jackdaws find a congenial breeding-ground in the clefts, and do much damage amongst the sea-fowls' eggs. The following species also breed in the cliffs in sparing numbers, viz., Starlings, House-Martins, Sand-Martins, Rock Pipits, Tree Sparrows, and a pair or two of Carrion Crows. It would be useless giving a list of the migratory birds which occasionally touch at Flamborough, as at the time of the Union's visit they will be absent.

Of **Mammals, Reptiles,** and **Fishes** there seem to be but few records.

CONCHOLOGY.—The Conchological section will be officially represented by its President, Mr. J. Darker Butterell, and its Secretary, Mr. F. W. Fierke.

Mr. F. W. Fierke writes:—Numerous isolated records have been made of land and freshwater mollusca by different observers who have visited Flamborough but no very systematic work has so far been undertaken; there can, however, be little doubt that the coast between Speeton, Bempton and Flamborough presents features worthy of more extensive and thorough investigation than the district has hitherto

received. The following list is compiled up to date and is either personally verified or recorded in print by other collectors :—*Arion ater* and var. *albolateralis*, *A. hortensis*, *Limax maximus*, *Agriolimax agrestis*, *A. lævis*, *Hyalinia cellaria*, *H. nitidula*, *H. crystallina*, *H. fulva*, *Helix pulchella*, *H. aspersa* and var. *exalbida*, *H. nemoralis*, *H. cantiana*, *H. rufescens*, *H. hispida* and var. *subrufa*, *H. itala*, *H. caperata* and var. *ornata*, *H. virgata* and var. *lineata*, *Pupa cylindracea*, *P. muscorum*, *Vertigo pygmæa*, *V. edentula*, *Clausilia perversa*, *Cochlicopa lubrica*, *Succinea putris*, *S. elegans*, *Carychium*, *Planorbis fontanus*, *P. nautileus*, *P. albus*, *P. spirorbis* and m. *scalariforme*, *Limnæa peregra*, *L. palustris*, *L. truncatula*, *Ancylus fluviatilis*, *Velletia*, *Sphærium corneum*, *S. lacustre* and var. *ryckholtii*, *Pisidium fontinale*, *P. pusillum*, and *P. nitidum*.

MARINE ZOOLOGY.—The Marine Zoology Committee will be represented by Messrs. J. D. Butterell, W. Cash, F.G.S., Rev. W. C. Hey, M.A., T. H. Nelson, M.B.O.U., and J. W. Woodall, F.G.S.

Mr. J. Darker Butterell writes that although the tide is not so favourable as at the spring tides of the equinoxes, there is nevertheless good work to be done by those who will steadily collect as close to dead low water as possible. The best ground for shore-collecting is among the loose stones at South Landing and the flat scars between there and the extremity of the Headland. Of **Fishes** there are Butterfish, Blennies, Rocklings, Eels, etc., and Gobies should be looked for. Of **Mollusca** in addition to those noted by Rev. W. C. Hey in 'Flamborough Village and Headland' (p. 130), are to be found *Dendronotus*, *Eolis*, *Aplysia*, *Tectura*, etc. Of **Crustacea** there are numerous species, including *Inachus dorynchus*, *Hyas coarctatus*, *H. araneus*, *Carcinus mænas*, *Cancer pagurus*, *Porcellana longicornis*, *Galathea squamifera*, *Pandalus annulicornis*, *Hippolyte cranchii*, *Virbius varians*, *Pycnogonum littorale*, various species of *Mysis*, etc. Of **Echinoderms** may be collected *Asterias rubens*, *Solaster papposa*, *Cribella*, and various *Ophiocomæ*. Of **Sea-Anemones** there are *Actinia mesembryanthemum*, *Tealia*, *Sagartia miniata*, etc., while **Sponges, Hydroid Zoophytes, Worms,** etc., invite research.

ENTOMOLOGY.—The Entomological section will be officially represented by its President, Rev. W. C. Hey, M.A., and its Secretaries, Messrs. A. E. Hall, F.E.S., and Wm. Hewett.

Lepidoptera.—Mr. J. W. Boult, of Hull, has taken or observed *Vanessa urticæ*, *V. atalanta*, *Satyrus janira*, *S. hyperanthus*, *Lycæna icarus*, *Macroglossa stellatarum*, *Zygæna trifolii*, *Z. loniceræ*, *Z. filipendulæ*, *Hepialus velleda*, *Strenia clathrata*, *Emmelesia decolorata*, *E. bipunctaria*, *Panagra petraria*, and *Dianthæcia capsincola*.

Coleoptera.—The Rev. W. C. Hey, M.A., writes that a spot so much exposed as the headland is naturally not rich in Coleoptera. The north side is particularly barren, but some collecting may be done under the more sheltered cliffs which extend from the Matron Rock to Danes Dike. The piles of sea-weed that lie here rotting in the sun are rich in such species as *Cafius xantholoma*, *Cercyon littorale*, *Oxyteli*, etc. Some sweeping and beating too, may be done in Danes Dike, but there seems to be nothing of particular interest. Any carrion that may be found generally yields the uncommon burying beetle, *Necrophorus ruspator*.

Other Orders.—No records.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each } At the North Star Inn, Flamborough North
4-30 p.m.—Sectional Meetings } Landing.
4-45 p.m.—General Meeting } (Shown on Map, square C 2).
5-15 p.m.—Conveyances leave for Railway Station, fare 9d.
6-1 p.m.—Departure of train for Scarborough.
6-4 p.m.—Departure of train for Bridlington, Hull, Leeds, etc.

ANNUAL MEETING.—The York Society will on this occasion have a series of Exhibits in the Museum to illustrate the work done by the Union and all its Sections, Committees, and Members during the season of 1895; and they hope to rely on all workers to support them in making a successful display.

Yorkshire Naturalists' Union.

President:

ROBERT BRAITHWAITE, M.D., F.L.S., London.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

HUNDRED-AND-SEVENTEENTH MEETING

Will be held at

RICHMOND,

For the investigation of

Whitcliffe and Hag Woods, the adjacent Banks of the Swale, and the Moorlands lying north,

On Bank Holiday Monday, Aug. 5th, 1895.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Richmond to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday, Saturday, or Monday, August 2nd, 3rd and 5th will be available for return any day up to Tuesday, August 6th.

HOTEL ACCOMMODATION.—Members will find accommodation at any of the hotels at Richmond, but as the town is always full at holiday times rooms should be ordered well in advance.

BOOKS AND MAPS.—The district for investigation is included in Sheet 97 N.E. one-inch Ordnance Map (also published geologically coloured, as also are the six-inch Sheets 38 and 39). Reference may be made to Phillips' 'Illustrations of Yorkshire Geology,' to his 'Rivers, Mountains and Sea-coast of Yorkshire,' and to both editions of Baker's 'North Yorkshire.' Mr. James Ward's list of plants appears in various old editions of the local guide books, and there is much information on the birds by Mr. H. Smurthwaite in the vols. of Morris's 'Naturalist' (1851-1858). The Darlington Saturday Half-Holiday Guide (1/-) has chapters on the Botany and Entomology of Richmond. Miss Plues' botanical books refer specially to Swaledale. Clarkson's 'History and Antiquities of Richmond,' 1821, contains a list of rarer plants.

SATURDAY'S ROUTES.—Mr. Richard Barnes will lead a party, starting from the station at 11-50 a.m. to investigate the Red Scar, Downholme.

MONDAY'S ROUTES.—The following routes have been arranged, viz.:—

I.—The Geological party will proceed in a northerly direction to Gilling, passing over the series in descending order, under the leadership of Mr. Joseph Raine.

II.—Whitcliffe Wood (B 3 and C 3 on Map) will be found the most productive part of the district for entomologists.

III.—Along the southern escarpment of the Swale Valley, below Hudswell and in Hag Wood, much good work can be done.

IV.—The moorlands lying W.N.W. of Richmond are well worth investigating.

Mr. J. Raine, Mr. W. Horne, F.G.S., and others will take part in the leadership of the parties.

All parties will start from Richmond Railway Station on the arrival of the 9-58 and 11-50 a.m. trains.

Permission to visit their estates is kindly granted by Lord Bolton and other landowners; and Mr. J. Smurthwaite will allow members to visit his beautiful place, the Temple Grounds.

GEOLOGY.—The Geological section will be officially represented by its President, Mr. S. Chadwick, F.G.S., and its Secretaries, Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. W. Stather, F.G.S.

Rev. W. Lower Carter, M.A., F.G.S., writes that the Geological Survey Memoir of the country round Richmond has not yet been published, but the following notes have kindly been furnished by Mr. Wm. Gunn, who surveyed the district:—'In the two or three miles of country to the north of Richmond, between Richmond and the Gilling Valley, there is a fairly typical section of nearly the whole of Prof. Phillips' Yoredale Series. There are numerous quarries just north of Richmond in the Red Beds Limestone, which yields many brachiopods and fish teeth. These Red Beds lie above the Yoredales of Prof. Phillips. The Main Limestone, the uppermost bed of Prof. Phillips' Yoredales, crops out just north of the Race Course, and, the beds having a general southerly dip, nearly all the limestones and sandstones of the series can be seen to outcrop one after another, forming a set of escarpments overlooking the Gilling Valley. The same beds come on to the north of Gilling but with a northerly dip, so that most of the same series is there seen over again, but not so plainly. The Gatherley Moor Grit used to be supposed Millstone Grit, and is so mapped by Phillips, but this is a mistake. It belongs to the so-called 27 Fathom Grit which lies below the Underset Limestone. A fault runs through the town of Richmond in a N.E. and S.W. direction which repeats the Main Limestone in the river opposite the Friary. On the line of this fault, south of the Swale, are some old workings, said to have been copper mines, and there are old copper and lead workings near the town on the north side.'

MILLSTONE GRIT.

YOREDALE BEDS.

- Shales and Sandstones
- *Crow Limestone and Chert*
- *Ten Fathom Grit*
- Shales
- *Red Beds* (Siliceous Limestone and Shale)
- Black Beds and Main Chert
- MAIN LIMESTONE
- Sandstone and Shale
- UNDERSET LIMESTONE & CHERT
- Sandstone and Shale
- *Third Set Limestone*
- Sandstone and Shale
- *Fourth Set Limestone*
- Sandstone and Shale
- *Fifth Set Limestone*

The general succession of the beds under inspection is given in the margin. The Simonstone Limestone and Hardraw Scar Limestone, which appear higher up Swaledale and in Wensleydale and complete the Yoredale Series, are not seen in the neighbourhood of Richmond.

BOTANY.—The Botanical Section will be officially represented by its President, Mr. H. Soppitt, and its Secretaries, Messrs. A. H. Pawson, and M. B. Slater, F.L.S., and the Mycological Committee by Mr. H. T. Soppitt.

Mrs. Davidson, of Richmond, sends the following notes of plants she has found in Whitcliffe Woods, and in the rough places just beyond the woods, under the hills:—*Lathræa squamaria, Ranunculus flammula, R. auricomus, Myosotis sylvatica, Melampyrum sylvaticum, Orchis mascula, Hieracium sylvaticum, H. pilosella, Hypericum pulchrum, Draba verna, Polygala vulgaris, Arabis hirsuta, Valerianella olitoria, Thymus serpyllum, Helianthemum vulgare, Lychnis diurna, Stellaria holostea, S. graminea, Sedum acre, Conopodium denudatum, Galium cruciatum, Eupatorium cannabinum, Carduus nutans, Tragopogon pratensis, Leontodon hispidus, Crepis virens, Lapsana communis, Jasione montana, Oxalis acetosella, Vaccinium myrtillus, Campanula rotundifolia, Linum catharticum, Calamintha clinopodium, Geranium sylvaticum, G. pratense, G. robertianum, G. lucidum, Origanum vulgare, Vicia sepium, Fragaria vesca, Potentilla tormentilla, Lathyrus macrorrhizus, Agrimonia eupatoria, Epilobium montanum, Primula vulgaris, P. veris, P. elatior, P. farinosa, Lysimachia nemorum, Stachys betonica, Lonicera caprifolium, Carex præcox.* Below the Whitcliffe Woods and nearer the River Swale grow *Cardamine amara, Mentha aquatica, Pedicularis palustris, Veronica beccabunga, Arenaria verna, Cochlearia officinalis. Primula farinosa* grows in a wet spot below the woods, and *Trollius europæus* grows near hedges the opposite side the river and has also been found in Coalsgarth Wood. Another rather uncommon flower she has found in woods the opposite side the Swale, viz. :—*Gagea lutea.* Among the shrubs in Whitcliffe Woods are *Viburnum opulus, V. lantana,* and *Prunus padus.*

Mosses and Hepatics.—Mr. R. Barnes writes:—The Richmond district affords most excellent ground for bryological research, especially in that portion between Whitcliffe Wood and Marske on the north bank of the river, and Billy Bank Wood and the Red Scar, Downholme, on the south. The shaded rocky recesses, together with the various other favourable localities that occur within these limits, yield, as will be noticed in the subjoined list, a goodly number of rarer mosses, and although this is not the best season of the year for gathering either mosses or hepatics, there is reason to believe some good work may be done, should the weather remain in any degree favourable. Sandbeck, an interesting little glen lying somewhat south of the Round Howe, will be found well worthy of investigation. In this locality *Didymodon luridus* and *Zygodon stirtoni* have been gathered in a fruiting condition. *Sphagna* and other paludal species should be sought for on the moorlands on either side of the river. *Sphagnum strictum* and *Amblyodon dealbatus* have been gathered on Richmond Out-moor, and *Meesia uliginosa* has been recorded as having been found near the same locality, and *Splachnum ampullaceum* for Downholme Moor.

In addition to those referred to above the following species have been duly noted to occur in the district:—*Dicranella schreberi, D. rufescens, Pleuridium nitidum, Seligeria doniana, S. pusilla, S. acutifolia* var. *longiseta, Didymodon sinuosus, Trichostomum nitidum, Barbula revoluta, B. angustata, B. intermedia, B. papillosa, Amphoridium mougeotii, Ulota crispula, Orthotrichum cupulatum* var. *medium, O. fastigiatum, O. stramineum, O. tenellum, O. sprucei, O. rivulare, Webera cruda, Fissidens exilis, F. decipiens, F. fontanus, Anomodon longifolius, Pterogonium gracile, Orthothecium intricatum, Eurhynchium teesdalii, Rhynchostegium depressum* (with fruit), *R. tenellum, Amblystegium sprucei, A. confervoides, Hypnum incurvatum, H. polymorphum, Lejeunea rossettiana, L. calcarea.* The Hepaticæ have not been adequately worked, and seeing the district yields so many of our rarer mosses something good may also be expected in that section.

Lichens, Fungi and Algæ.—No records.

VERTEBRATE ZOOLOGY.—

Mammals.—Mr. Gelderd has noted the Long-eared Bat, Pipistrelle, Hedgehog, Mole, Common Shrew, Badger, Otter, Weasel, Stoat (both common), Fox, Squirrel, Long-tailed Field Mouse, Field Vole, Hare, and Rabbit.

Birds.—The following birds have been seen by Mr. J. W. Gelderd near Richmond:—Merlin (nesting on moor near Black Plantation, 1895), Kestrel (nesting on rocks near Willan's Leap, 1895), Sparrow Hawk (nesting in Black Plantation, 1895), Hen Harrier (one pair seen on moor, 1894), Tawny Owl (common in Black Planta-

tion), Long-eared Owl (nests found in several of the woods and clutch of three eggs noted 1895), Short-eared Owl (one seen twice on moors), Barn Owl (wood under Willan's Leap), Spotted Flycatcher, Pied Flycatcher (in Whitcliffe Woods), Dipper (common in river, nesting), Song Thrush, Redwing (in winter), Fieldfare (in winter), Blackbird, Stonechat, Redstart, Whinchat, Wheatear, SedgeWarbler, Grasshopper Warbler, Blackcap (nesting), Wood Warbler (nesting), Willow Warbler (nesting), Chiff-chaff (nesting), Golden-crested Wren (Whitcliffe Woods), Wren, Tree Creeper, Nuthatch, Great Titmouse, Blue Titmouse, Marsh Titmouse, Long-tailed Titmouse. Pied Wagtail, Grey Wagtail, Yellow Wagtail, Tree Pipit, Skylark, Woodlark. Reed Bunting, Yellow Bunting, Chaffinch, Tree Sparrow, Hawfinch, Greenfinch, Goldfinch, Lesser Redpole, Linnet, Bullfinch, Crossbill (I once saw a flock of about 30 in some larch trees, among which were some fine males in splendid red breast), Starling, Carrion Crow, Rook, Jackdaw (builds in rocks in Whitcliffe Woods), Magpie, Jay, Green Woodpecker (nest in Black Plantation, 1894), Great Spotted Woodpecker, Cuckoo, Kingfisher, Swallow, Martin, Swift, Nightjar, Red Grouse.

Of **Reptiles** and **Fishes** there are no records seemingly.

CONCHOLOGY.—The Conchological section will be officially represented by its Secretary, Mr. F. W. Fierke.

The district has not been as yet worked, but should be rich in species affecting woodlands, and the limestone scars are well worth examining.

ENTOMOLOGY.—The Entomological section will be officially represented by its Secretaries, Messrs. A. E. Hall, F.E.S., and Wm. Hewett.

The Richmond district is one of the richest districts for Entomology that Yorkshire can produce.

Lepidoptera.—The late John Sang, in the Darlington Saturday Half-Holiday Guide, 1882, wrote that Whitcliffe Wood, and the bare slopes below Willan's Leap, are very productive, several great rarities occurring there, including *Anesychia funerella* and *Gracillaria imperialella*, only elsewhere taken in the fens near Cambridge. *Eupithecia constrictata* is not unfrequent. The Black and High Moor Plantations, on the higher ground, are also very full of insect life, and many great rarities have occurred there. *Argynnis paphia* also occurs. The Whitcliffe and Applegarth Woods, sheltered as they are from adverse winds and with a southern exposure, are the localities most productive and best worked by entomologists.

Mr. J. W. Gelderd, of Darlington, furnishes the following list of species he has taken in August within three miles of the town :—*Pieris brassicæ*, *P. rapæ*, *P. napi*, *Argynnis euphrosyne*, *Vanessa urticæ*, *V. io*, *V. atalanta*, *V. cardui*, *Epinephile janira*, *Chortobius pamphilus*, *Polyommatus agestis* and var. *salmacis*, *P. icarus*, *Euthemonia russula*, *Arctia fuliginosa*, *Selenia illustraria*, *Hemerophila abruptaria*, *Larentia olivata*, *Eupithecia pygmæata*, *E. indigata*, *E. nanata*, *Thera variata*, *T. firmata*, *Coremia furrugata*, *Cidaria russata*, *C. immanata*, *Cilix spinula*, *Notodonta dictæa*, *N. dictæoides*, *Nonagria fulva*, *Charæas graminis*, *Noctua glareosa*, *N. conflua*, *N. neglecta*, *Polia chi*, *Epunda veminalus*, *Abrostola urticæ*, *Plusia iota*, *P. gamma*, and *P. interrogationis*.

Coleoptera.—Rev. W. C. Hey has noticed *Carabus catenulatus*, *Ocypus brunnipes*, *Elmis parallelopipedus*, etc. **Other Orders.**—No records.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each
5- 0 p.m.—Sectional Meetings
5-30 p.m.—General Meeting

} At the King's Head Hotel, Richmond.

ANNUAL MEETING.—The York Society will on this occasion have a series of Exhibits in the Museum to illustrate the work done by the Union and all its Sections, Committees, and Members during the season of 1895; and they hope to rely on all workers to support them in making a successful display.

Yorkshire Naturalists' Union.

HUNDRED-AND-EIGHTEENTH MEETING

Will be held at

APPLETREEWICK

FOR

TROLLER'S GILL,

On SATURDAY, September 7th, 1895.

(Alteration of date from Monday, Sept. 2nd, necessitated by railway arrangements.)

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lancashire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N.E. Railways which have booking arrangements for Bolton Abbey, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday or Saturday, September 6th and 7th, will be available for return up to Tuesday, September 10th.

HOTEL ACCOMMODATION may be had at the Inns and at Fell House Boardinghouse at Burnsall, as well as at the New Inn, Appletreewick.

BOOKS AND MAPS.—The district for investigation is included in Sheet 61 (formerly 92 N.E.) One-inch Ordnance Map (which is also published geologically coloured). There does not appear to be any information on the fauna aud flora.

PERMISSION to visit their properties has been kindly granted by the Bradford Corporation, Rev. J. W. Stavert, Mr. Henry Smith, Mr. W. Parker, Mr. Thomas Lumb, and Messrs. T. H. Burr & Craven.

ROUTES.—The district being seven miles from the nearest railway station it will be necessary to drive. Conveyances will leave Bolton Abbey station at 11 a.m. for Appletreewick; fare 2/6 for the double journey. **Conveyance seats must be definitely ordered** by members, addressing themselves (not later than Thursday's post to reach Friday morning) to Mr. John Ramsden, New Inn, Appletreewick, Skipton. Neither he nor the Secretary undertakes any further responsibility in the matter.

I.—The Geological party will be led by the hon. sec., the Rev. W. Lower Carter, M.A., F.G.S., and Mr. J. H. Howarth, F.G.S. They will have the advantage of notes kindly furnished by Mr. R H. Tiddeman, M.A., F.G.S. of H.M. Geological Survey.

II.—Naturalists will proceed by way of Skyreholme to the lower dam, thence up the gorge of Troller's Gill itself to the upper dam and the moorlands about Grimwith Reservoir.

Mr. Jonathan Thompson, of Fell House, Burnsall, the Rev. J. W. Stavert, and others will accompany the parties.

GEOLOGY.—Mr. R. H. Tiddeman, M.A., F.G.S., of H.M. Geological Survey, writes:—Geologists should note in driving along the Wharfe valley the gravel drifts which form considerable features on both sides of the river. There are two types, the terraces which range along both sides of the valley most of the way, and gravel mounds which occur only here and there. Of course, there are some mounds which are only terraces in a state of decay. The mounds occur about Strid Cottage, where, however, they are very much concealed by the woods, and also in a group about Appletreewick and Deebley.

Carriages should be vacated at Hoff Mill. Hoff Lumb, a beautiful pool hard by on the Wharfe, is well worth a visit if there is time. The rapids above it run through a gorge which marks the place where the Wharfe enters the Millstone Grits. The escarpment to the north-west runs up to the top of Burnsall Moor, and in the other direction trends to the north-east above Skyreholme Beck. In the fork between, the Carboniferous Limestone rises above Appletreewick, and much of it assumes the form of knoll-reefs. Returning from Hoff Lumb by the mill, the road to Appletreewick may be left by a foothpath to the right, a little above the chapel. Along the path a good view of the gravel mounds may be had and a section, where the brook has washed against them, may be seen. A small natural hollow, called on the 6-inch map Balker's Dub, shows the irregular nature of the deposits and points to the probability of their accumulation under glacial conditions. The route continues by Skyreholme Mill and Middle Skyreholme up the left branch of the stream. The Grit escarpment is here crossed again by another gorge, and after a short interval, which represents the Bolland shale, here not visible, we come to the Carboniferous Limestone dipping southerly at Skyreholme Dam. The Limestone forms an anticline, of which the stream gives a section in its course. The beds eventually turn over again to the north-west, and the Shales and Millstone Grit of Fancarl Crag come on again before reaching the Craven fault, a down-throw on the south which brings the said Grit crag against beds low down in the Carboniferous Limestone. At the top of Skyreholme Dam two valleys unite, the left-hand one takes us past the entrance to a lead mine, 'Head Vein;' some yards due north of this is a swallow hole in the upper part of the Limestone, called Hell Hole. 'Facilis decensus' for some little way, but further, candles, a rope, and mackintoshes may be useful. I am not aware that it has been fully explored.

The survivors have three courses open to them. They may rejoin the gill to the right, which is Troller's Gill, and from which we have made a digression. The hillside, east of this, shows a well ice-worn surface, with scattered boulders lying on it. A stroll up the valley takes us past an old dam where an interesting section may be seen. Crinoidal Limestone, 8 feet, blue slate, 20 feet, resting on calcareous mudstone with corals. Higher up are more lead mines and at the Grouse Inn to the north-east on the road to Pateley Bridge a guide may be obtained for the famous Stump Cross Cavern.

Another route takes in from Hell Hole *to the left* of Fancarl Crag by a rough road. When this meets the road from Grassington to Greenhow, a gate in the wall opposite leads across the moor to Grimwith Reservoir. Some of the walls in the fields below this moorland road are built of limestone conglomerate. The quarry whence these were got is now covered up but similar rock may be occasionally seen in the brook below when the stream is low.

BOTANY.—There appears to be no available information relating especially to the area set apart for investigation.

VERTEBRATE ZOOLOGY.—The same remarks apply to the vertebrate fauna of the Gill.

CONCHOLOGY.—Conchologically the romantic and highly picturesque gorge of Troller's Gill is a rich hunting ground: the limestone crags and scars of the gorge itself yield such species as *Azeca tridens*, *Helix lapicida*, *Clausilia cravenensis*, and all the usual calcareous and woodland mollusca. There are also a mill-dam above, where *Limax lævis* occurs plentifully, and another, the Skyreholme mill-dam, below, in which *Limnæa peregra* may possibly be found to vary with its environment; and *Ancylus fluviatilis* is in profusion in the connecting stream.

ENTOMOLOGY.—The insects of the Gill are so far unknown, and the place would probably repay close and systematic investigation.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each
4-30 p.m.—Sectional Meetings
4-45 p.m.—General Meeting
} All at the New Inn, Appletreewick.

5-15 p.m.—Conveyances leave New Inn for the station.
6-45 p.m.—Departure of train from Bolton Abbey Station for Leeds, etc.

Yorkshire Naturalists' Union.

President:

ROBERT BRAITHWAITE, M.D., F.L.S., London.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

HUNDRED-AND-NINETEENTH MEETING

Will be held at

HUDDERSFIELD

FOR A

FUNGUS FORAY,

SEPTEMBER 7th to 10th, 1895.

The Y. N. U. Mycological Committee, of which Mr. Charles Crossland, 4, Coleridge Street, Halifax, is the Hon. Secretary, will take charge of the whole of the arrangements for this meeting. Mycologists from any part of Britain are cordially invited. The following have signified their intention to be present:—Dr. M. C. Cooke, M.A., A.L.S.; Mr. Geo. Massee, F.R.M.S., F.L.S., Royal Herbarium, Kew; Mr. Carleton Rea, M.A., B.C.L., Worcester; Rev. W. Fowler, M.A., and other members of the Mycological Committee.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lancashire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Huddersfield, to Members and Associates of the Y. N. U. producing their signed card of Membership. Tickets taken on Saturday, Monday or Tuesday, Sept. 7 to 10, will be available for return any day up to Tuesday, Sept. 10th.

HOTEL ACCOMMODATION.—Members will find accommodation at any of the Huddersfield Hotels.

SATURDAY'S ROUTES.—Mr. A. Clarke will lead a party starting by waggonette from Huddersfield Station at 10 a.m. to investigate Mollicar and Storthes Hall Woods. Fixby Woods, so well known as having been one of Bolton's hunting grounds, will also be visited.

MONDAY'S ROUTES.—Mr. C. Crossland and Mr. James Needham will conduct a party, starting from Hebden Bridge Station at 10-15 a.m., to Hardcastle Craggs and adjoining woods. Train leaves Huddersfield at 9-25.

TUESDAY'S ROUTES.—Councilor F. Crosland will lead a party starting from St. George's Square, by tram at 10 a.m., to Lockwood for Big Valley and Armitage Bridge Woods, passing en route through Beaumont Park.

All parties will meet each day after the ramble in the Lecture Room of the Y.M.C.A., King Street, Huddersfield, to examine the specimens collected. The specimens will be arranged and on exhibition on Monday and Tuesday evenings.

Refreshments can be had at the Restaurant adjoining the premises.

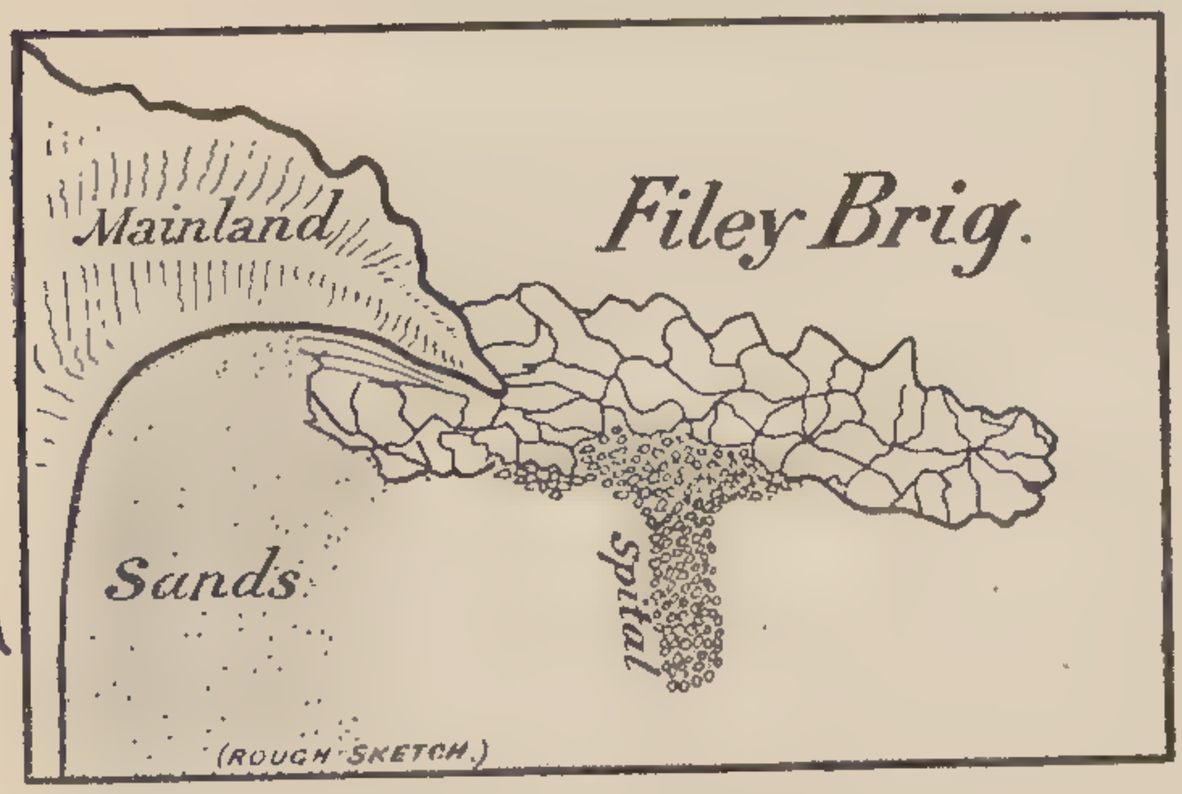
ANNUAL MEETING.—The York Society will on this occasion have a series of Exhibits in the Museum to illustrate the work done by the Union and all its Sections, Committees, and Members during the season of 1895; and they hope to rely on all workers to support them in making a successful display.

Yorkshire Naturalists' Union.

HUNDRED-AND-TWENTIETH MEETING,

FILEY BRIG

On Saturday, September 21st, 1895.



Railway Arrangements.—As usual. Tickets taken for Filey on Friday, Saturday, or Monday, September 20th to 23rd, will be available for return any day up to Tuesday, September 24th.

The Yorkshire Marine Zoology Committee, of which Mr. J. Darker Butterell, 4, Willow Grove, Westwood, Beverley, is Hon. Secretary, will have entire charge of the arrangements for the excursion.

LOW TIDES will be about 11 a.m. on Friday, 20th September, 12 noon on Saturday, 21st, 1 p.m. on Sunday, 22nd, and 2 p.m. on Monday, 23rd, being on these days the lowest spring tides of the autumnal equinox, and therefore exceptionally favourable for exploring the rock pools for marine life.

This excursion has been arranged specially with a view of giving Marine Zoologists and Botanists an opportunity of exploring the coast to the best advantage, i.e., at the time of the equinoctial tides, and to give an impetus to the work of the Marine Zoology Committee.

There is perhaps no point on the north-east coast so favourably situated for the study of marine life as Filey Brig, consisting as it does of a headland of hard, almost impenetrable masses of oolitic rock, submerged at high-water, but laid bare as the tide recedes, leaving numerous pools on the body part, while the lower ledges are more rarely exposed, dependent on favorable tides and winds.

The Spittal is a narrow patch of rocks jutting out at a right angle from the Brig which may only be explored during very low tides but more especially at the time of the spring tides of the equinoxes.

Mr. J. Darker Butterell (hon. sec.) and Mr. F. W. Fierke (Hull) will conduct the Marine Zoology party, and Mr. J. Frazer Robinson (Hull) will be in charge of the botanists.

The Brig is about a quarter-of-an-hour's walk from the railway station; members are desired to proceed direct on the arrival of their trains.

The plan of operations for the day is as follows :—

I.—To explore the rocks at the northern and eastern extremities of the Brig for annelids, sponges, molluscs, &c.

II.—To investigate the Spittal at low-water for echinoderms, crustaceans, &c.

III.—To collect the marine algæ in the rock pools of the Brig.

If feasible, at the conclusion of the day's investigations, arrangements will be made for the party to meet in the neighbourhood and discuss matters affecting the furtherance of the study of the marine flora and fauna of the east coast. It is hoped that all interested in the work will make a special effort to be present.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Ex-Presidents:

REV. WM. FOWLER, M.A., Liversedge.
H. CLIFTON SORBY, LL.D., F.R.S., etc., Sheffield.
JOHN GILBERT BAKER, F.R.S., F.L.S., Kew.
RT. HON. LORD WALSINGHAM, M.A., F.R.S., Thetford, Norfolk.
REV. W. H. DALLINGER, LL.D., F.R.S., etc., London.
SIR RALPH PAYNE-GALLWEY, BART., M.B.O.U., Thirkleby Park.
WILFRID H. HUDLESTON, M.A., F.R.S., Weybridge.
HENRY EELES DRESSER, F.L.S., F.Z.S., London.
RT. REV. WM. WALSHAM HOW, D.D., Lord Bishop of Wakefield.
PROF. A. H. GREEN, M.A., F.R.S., F.G.S., Oxford University.
CHAS. P. HOBKIRK, F.L.S., Dewsbury.
R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Bridgend.
ROBERT BRAITHWAITE, M.D., F.L.S., London.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Assistant Hon. Secretary (for this meeting):
B. M. SMITH, 35, Princess Road, Ripon.

THE 122ND MEETING

Will be held at

RIPON,

For the investigation of

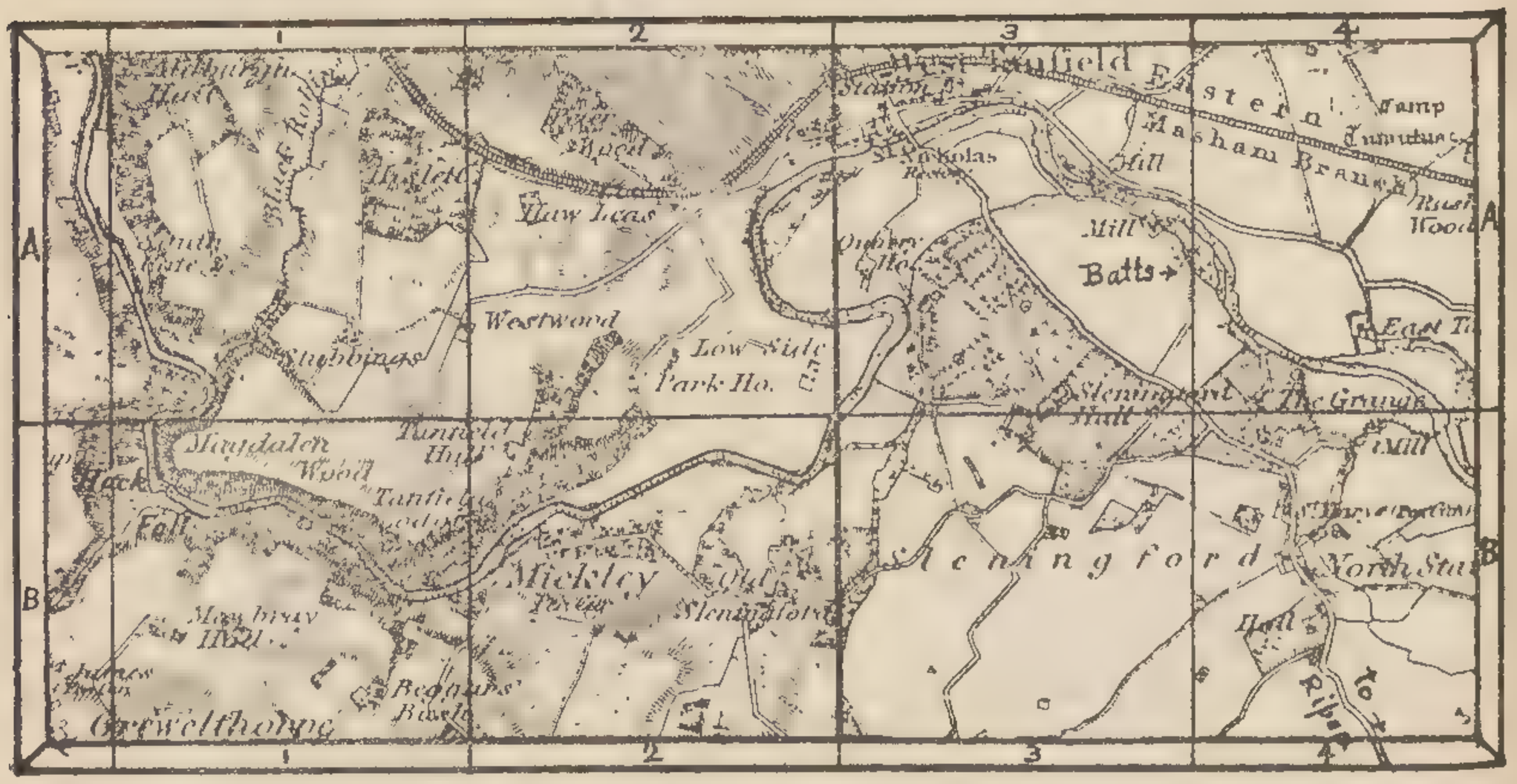
HACKFALL and TANFIELD,

And the country between those places and RIPON,

On SATURDAY, APRIL 18th, 1896.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Ripon, Tanfield or Masham, to Members and Associates of the Y. N. U. producing their signed card of Membership. Tickets taken on Friday or Saturday, April 17th or 18th, will be available for return any day up to Monday, April 20th.

HOTEL ACCOMMODATION.—Members will find accommodation at Masham (King's Arms), Tanfield (Bruce Arms, or Mrs. Stone's Lodgings), Mickley (Mackley's Inn), Grewelthorpe (Hackfall Inn), or Ripon (Studley Royal, Crown, or Unicorn Inns).



EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines.

BOOKS AND MAPS.—The district for investigation is included in Sheets 51 and 52 (97 S.E. and 96 S.W.) one-inch Ordnance Map (also published geologically coloured). The six-inch Sheets are 101 and 102. Reference may be made to Davis and Lees' West Yorkshire, 1878 (florula of Hackfall at p. 287), and to the Ripon lists of plants by Mr. Pratt (in Millenary Record, 1892), and Rev. H. H. Slater (Trans. Y.N.U.). Miss Harrison published a list of ferns in the Naturalist for June, 1856, pp. 136-7; and about 1858 the Rev. James Dalton published a paper on the mollusca of the banks of the Ure, which we are unable to trace; perhaps some reader will indicate in what magazine the paper was published. The botanical works by Miss Plues include notices of the plants of the Ripon district.

THE DISTRICT for investigation lies entirely on the right or South bank of, and mostly close to, the River Yore, from Hackfall to Ripon. All records from the opposite side of the river should be kept carefully distinct, as being in quite another vice-county (North-west Yorkshire).

PERMISSION to visit their properties has been kindly granted by Lord Ripon (including free admission to Hackfall grounds), Sir Reginald Graham, Bart., Mr. T. Arton, Mrs. Hammond and Son, Miss Staveley, and the farmers in the neighbourhood.

ROUTES.—

I.—Members arriving at West Tanfield Station at 9-32 a.m. (7-50 from Thirsk, 7-55 from Leeds, 9-15 from Ripon) will explore the Woods at Hackfall and Mickley, and may either return to Ripon by Conveyance (which must be ordered beforehand, see below), or join Route II at noon. Leaders: Messrs. T. Pratt, J. Farrah, B. M. Smith, etc.

II.—Members arriving at West Tanfield Station at 12-12 p.m. will explore the banks of the Ure at Tanfield Batts, and thence proceed leisurely along the river banks and through Ripon Parks to Ripon. Leaders: Messrs. T. Pratt, J. Farrah, B. M. Smith, etc.

III.—The Geological members will accompany Route II.

CONVEYANCE will leave Hackfall at 3-30 p.m., to bring the party taking Route I to Ripon (Fare 1/-) and calling at Mickley Village, 4 p.m. (Fare 9d.) The above fares are conditional upon ordering seats in advance from B. M. Smith. The charge for members not ordering seats will be 1/6 from either place.

GEOLOGY.—Mr. Smith (Sec. Ripon Nat. Club) has collated the following information from various sources, chiefly former circulars of Y.N.U. :—

There are four formations apparent in Ripon and neighbourhood:—

1. Millstone grit—Cayton beds in three layers.
2. Permian beds.
3. Trias or New Red.
4. Glacial or Boulder Clay.

The upper layer of Cayton beds contains abundance of Encrinites, the second plenty of Brachiopods, the third is a hard, fine sandstone. The following fossils have been noted:—*Orthis resupinata*, *O. michellini*, *Productus semi reticulatus*, *P. cora*, *P. aculeata*, *Spirifera lineata*, *S. trigonalis*, *S. striata*, *Spiriferina cristata*, *S. octoplicata*, *Streptorhynchus crenistria*, *Strophomena analoga*, *Chonetes hardrensis*, *Rhynchonella pleurodon*. Over the above beds come the Red Grit of the Plumpton series as found at Brimham and Studley Park. The Permian rests unconformably on the Plumpton Grit. The Trias lies east of the Ure and belongs to the Bunter Series. It is a soft Red Sandstone and contains splendid contortions of Gypsum beds which will be pointed out to the visitors. Geologists will do well to secure some photographic friends' assistance at this point in the day's work. The Boulder clay is superimposed generally over the whole district.

BOTANY.—The Botanical section will be officially represented by its President, Mr. M. B. Slater, F.L.S., and one of its Secretaries, Mr. John Farrah.

Flowering Plants.—Mr. John Farrah writes: The district to be traversed is botanically one of the best in England, and has afforded the writer the greatest pleasure at all seasons for many years past. The date of the excursion is too early for a very large number of plants to be found in bloom, yet, owing to the forward state of vegetation a goodly variety will be observed, many of which are comparative rarities, and where the plants are not actually flowering scores of species will be recognisable by their foliage, and the eye of the plant-lover delighted with the abundant promise of floral wealth that will be actually fulfilled during the "merry month of May" and the "leafy month of June." Amongst the rarer plants seen will be *Thalictrum flavum*, *Ranunculus auricomus*, *Helleborus viridis*, *H. fœtidus*, *Aconitum napellus*, and *Nuphar lutea*. *Trollius*, *Eranthis*, *Aquilegia* and *Berberis* should be looked for. *Cardamine amara*, *Arabis thaliana*, *A. hirsuta*, and *Cochlearia officinalis* will be seen among the crucifers. Among the star-worts should be seen *Cerastium glomeratum*, *Stellaria aquatica*, and *S. uliginosa*. In the space at disposal it is impossible to draw attention to a tithe of what is to be seen, and we will mention a few more irrespective of arrangement—*Geranium pusillum*, *Euonymus europæus*, *Astragalus glycyphyllus*, *Comarum palustre*, *Bryonia dioica*, *Saxifraga tridactylites*, *S. granulata*, *Ægopodium podagraria*, *Myrrhis odorata*, *Adoxa*, *Valeriana dioica*, *Tanacetum vulgare*, *Artemisia vulgaris*, *Petasites vulgaris* (the female plant is found in several places near Ripon, a fact to be noted as many botanists have never seen it), *Crepis paludosa*, *Vinca minor*. *Linaria cymbalaria* along with *Sedum dasyphyllum* on the walls of Tanfield churchyard. *Lathræa squamaria* will doubtless be seen in many places by the river bank, at the Plaster Pits especially. *Salvia verbenaca*, *Lamium galeobdolon*, *Myosotis collina*, *Pinguicula vulgaris*, *Primula farinosa*, *Lysimachia nummularia*, *Orchis ustulata*, *O. morio*, *O. mascula*, *Carex acuta*, etc. A full list of the flora of Ripon and neighbourhood, by the Rev. H. H. Slater, appears in parts 7 and 8 of the Transactions of the Y.N.U. We particularly draw the attention of botanists to that gentleman's remarks under *Osmunda regalis* on the wanton destruction of ferns and flowers. It will be noticed that we have only drawn attention to some of the plants that will be actually seen during the excursion. Botanists who visit the same ground in June and July will be charmed with the number and variety of its florula.

Mosses and Hepatics.—In the Y.N.U. Circular of 29th March, 1880, Rev. H. H. Slater noted that *Hookeria lucens*, *Bryum commutatum*, *B. proliferum*, *Tetrodontium browneanum*, and *Jungermannia cuneifolia* have been found near Hackfall.

Lichens, Fungi, and Algæ.—There are no records, but Mr. Chas. Crossland (4, Coleridge Street, Halifax) will be glad to receive on behalf of the Mycological Committee any fungi collected.

VERTEBRATE ZOOLOGY.—The Vertebrate section will be represented by its President, Mr. Thos. H. Nelson, M.B.O.U., and one of its Secretaries, Mr. Oxley Grabham, M.B.O.U.

Mr. James Carter, M.B.O.U., of Burton House, near Masham, who has a most intimate personal knowledge of the vertebrates of the whole district, mentions that Hackfall and its environs are favourite haunts of the Fox, Otter, and Badger. A specimen of the last named was captured quite recently, and is still, he believes, living in a state of activity. The Great and Lesser Spotted Woodpeckers nest there every year as well as most of our spring immigrants, including the Pied Flycatcher and Wood Warbler; the former unusually frequent there owing to suitable surroundings for such species.

Fishes.—Mr. F. M. Walbran writes that the fish which inhabit the stretch of river which extends from Hackfall to Ripon are Grayling, Trout, Dace, Chub, Barbel, Eel, Perch, Pike, Salmon, Bull Trout.

CONCHOLOGY.—The Conchological section will be represented by its President, Mr. H. Crowther, F.R.M.S.

The woods at Hackfall and Mickley are amongst the most productive to be found in Yorkshire, yielding the great bulk of the woodland mollusca, including *Helix lamellata* in profusion, *Pupa ringens*, *Clausilia laminata*, etc., and in the river Ure, at Hackfall, is to be found *Neritina fluviatilis*.

ENTOMOLOGY.—Entomologically much ought to be done in the woods and along the river-banks, but it does not appear that very much is known.

Mr. J. Waite, signalman, of Ripon, writes that he has found in the district to be investigated the following in the larval state on willow catkins, etc.:—*Eupithecia tenuiata*, *Xanthia cerago*, *X. silago*, *X. ferruginea*, *Orthosia lota*, *Tæniocampa gothica*, *T. instabilis*, etc.

Mr. J. Carter writes that the Comma Butterfly (*Vanessa c-album*) occurs in the district. Some years ago, when following the otter hounds, he met with quite a flight of them feeding on the Scabious, and he captured four specimens.

WORK TO BE DONE by members who have no special object of investigation. **Worms** (especially the small aquatic and mud-haunting species) to be collected and sent to Rev. Hilderic Friend, 7, Fern Bank, Cockermouth; **Diptera** to P. H. Grimshaw, F.E.S., 26, Montpellier Park, Edinburgh, or R. H. Meade, 1, Mount Royd, Manningham; **Orthoptera, Trichoptera, Neuroptera,** to G. T. Porritt, F.L.S., Crosland Hall, Huddersfield; and Tubes of Water containing **Freshwater Algæ,** to W. West, F.L.S., 15, Horton Lane, Bradford.

PHOTOGRAPHIC DARK ROOMS. — Mr. H. B. Rudd, chemist, Westgate, and Mr. C. Watson, photographic artist, Kirkgate, have each a dark room which is at the convenience of members requiring the same.

PROGRAMME OF MEETINGS.—

5-0 p.m.—Meat Tea, 2/- each, at the Studley Royal Hotel, Ripon.
6-0 p.m.—Sectional Meetings } at the Museum, Ripon, by kind permission of the
6-30 p.m.—General Meeting } Ripon Naturalists' Club.

The chair at the General Meeting will be taken by Mr. HENRY CROWTHER, F.R.M.S., Vice-President.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Hon. Secretary for this Meeting:

EDWARD PEAKE, M.A., 12, Craven Terrace, Settle.

THE 123RD MEETING

Will be held at

HELLIFIELD,

IN CONNECTION WITH A

FOUR DAYS' EXCURSION,

FROM

Saturday, May 23 to Whit Tuesday, May 26,

FOR THE INVESTIGATION OF

BOWLAND.

N.B. **It will greatly facilitate the Secretaries' arrangements for conveyances, firstly, if as many members as can possibly manage it will attend the excursion, and secondly, if they will keep the Local Hon. Sec. (Mr. Peake) promptly informed of their intentions.** An additional reason for there being a good muster is that the district is not only rich and picturesque, but so far almost unexplored by Naturalists.

Newton-in-Bowland will be the centre for Naturalists, Whitewell for Geologists. Mr. R. H. Tiddeman, M.A., F.G.S., will take the leadership of the Geological party, and the Naturalists will have the benefit of the assistance of Mr. J. F. Pickard, Mr. W. Thistlethwaite, Mr. Thomas Altham, Mr. Marshall Demain, and Mr. T. Hartley, while the Rev. R. L. Jones, Vicar of Slaidburn, and other local gentlemen are taking interest in the visit.

Mr. Peake will give advice and information to members who cannot arrive so early as 11-40 a.m., Saturday. If a sufficient number arrive later on Saturday, conveyance can be had at same rate, 2/6 each.

The single day's excursion will be on Whit-Tuesday.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lancashire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Clitheroe, Hellifield, or Clapham, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday, Saturday, Sunday, or Monday, May 22nd to 25th, will be available for return any day up to Tuesday, May 26th. Where no through bookings are in operation, members should book to the most convenient junction, and re-book to destination. Reduced fares available for each stage of journey.

HOTEL ACCOMMODATION is not very extensive, and is in demand at Whitsuntide, so that **notice** should be given **at once.** Tariff for tea, bed, and breakfast: The Whitewell Hotel, 5/6; at Newton, the Hare and Hounds Inn, and Parker's Arms Inn; at Slaidburn, the Hark to Bounty Inn, and the Black Bull, 4/- or 4/6. Lodgings may also be obtained at a similar tariff—in Slaidburn, Miss Brennand, Beach Cottage, and Haythornthwaite, Town End; also in the vicinity of Newton, of which a list may be obtained from Mr. Thistlethwaite, of Newton-in-Bowland School, or of the Local Hon. Sec.; also at Dunsop Bridge, Mr. Parkinson, Stapleoak. It should be noted that Clitheroe is the post-town for the whole district.

BOOKS AND MAPS.—The district for investigation is included in four sheets of the one-inch Ordnance Map, viz.: 59 (91 N.E.), 60 (92 N.W.), 67 (91 S.E)., and 68 (92 S.W.), all of which are published geologically coloured. There are lists of the birds and of the flora of the Stonyhurst district, by Father Gerard, S.J., published at Stonyhurst College, price 6d. each; and reference may also be made to various papers on birds and plants, by J. F. Pickard, published in the Nat. Hist. Journal.

THE DISTRICT for investigation is the drainage basin of the Hodder, especially about Slaidburn, Newton, and Whitewell. The Day Excursion at the close will be devoted to the left, or Yorkshire bank, of the Hodder, from Whitewell to Bashall Eaves. The district is the largest area hitherto unvisited by the Union, and to those who are willing to put up with such accommodation as they can get, affords a field for very useful and interesting work, as its resources seem to be comparatively unknown. The upper end may be reached from Settle or Clapham, from whence a good road runs over the curious hill called 'Bowland Knotts' down to Dalehead or Stocks. The sources of the Hodder issue from the millstone grit hills on the north, a few miles above Stocks. It may then be followed through Slaidburn, Dunsop Bridge, and Whitewell, to its junction with the Ribble at Mytton, receiving several important tributaries near Dunsop Bridge. In the higher part of its course, the Hodder valley is very scantily wooded, but improves as it proceeds till, at Whitewell, woods and cliff form a miniature gorge, and suggest a comparison with the scenery of the Wye. There are small tarns on Newton and Waddington Fells. There is no corn grown, and the population is scanty.

PERMISSION to visit their estates has been kindly granted by the Rev. F. Parker of Waddington, Mr. F. Parmeter, agent for the Towneley Estate, Mr. W. Peel, of Knowlmere, Mr. W. King Wilkinson, of Slaidburn, and Major Parker, of Browsholme Hall, with the request that carefulness is shown in the matter of disturbing game.

SATURDAY'S ROUTES.—Conveyance leaves Clitheroe station at 11-40 to convey members and luggage to destination, fare 2/6 each. Geologists visit reef-knolls and local drifts about Whitewell. Naturalists explore vicinity of their lodgings. On Saturday evening, 7 to 10 p.m., members are invited to meet (by leave of Mr. Thistlethwaite) in the Friends' School-room, Newton-in-Bowland, where a few local specimens will be on view, and arrangements made for explorations on the following days.

Arrangements will be made for invading the Lancashire border at the Trough of Bowland under Mr. Tiddeman's guidance.

MONDAY'S ROUTES.—Geologists, led by Mr. Tiddeman, spend day about Knowlmere, Dunnow, and perhaps Slaidburn, starting from Whitewell at 9 a.m. Naturalists, led by Mr. Pickard, start from Dunsop Bridge at 9.30 a.m. to explore the Brennand Valley.

TUESDAY'S ROUTES.—Geologists drive from Whitewell to Slaidburn, starting at 9 a.m., thence walk over Bowland Knotts to Clapham in time for 5-2 p.m. train for Hellifield. Luggage can be sent to Clitheroe for Hellifield by carrier in the morning. Mr. Thos. Altham will start down the Hodder with naturalists at 9 a.m. from Whitewell. A party will start from Clitheroe station after the 9-10 train to meet him, led by Mr. Marshall Demain; and another party, led by Mr. James Hartley, after the 11-40 a.m. train, all returning to Clitheroe for the 4-57 train back to Hellifield.

GEOLOGY.—The Geological section will be officially represented by Mr. J. H. Howarth, F.G.S., who will represent the Secretaries, unable to be present.

Mr. R. H. Tiddeman, M.A., F.G.S., writes that Bowland is a district which has been of late years, probably in consequence of its distance from railways, very little visited by geologists, but here John Phillips and Gilbertson got many of their best specimens. The rocks are all Carboniferous, and in descending order consist of Millstone Grits, Bowland Shales, Pendleside Grit (inconstant), Pendleside Limestone, Shales-with-Limestones, and Carboniferous Limestone (main mass). The greater part of the limestones about Whitewell, Knowlemere, and Dunnow, probably belongs to the Pendleside Limestone horizon, and the display of Reef-knowls is exceedingly good and characteristic. These in lower parts of the valleys, with the steep slopes of Bowland Shales above, surmounted by the escarpments of Millstone Grit ('Pendle Grit'), give great charm to Bowland scenery. The drive from Clitheroe to Whitewell is for the most part tame, though giving good views of Pendle and its range in the distance, and contrasts strongly with the vigorous features of the Forest of Bowland. Starting from one great anticline at Clitheroe, another will be met with at Whitewell, and a third at or near the Trough of Bowland. The second anticline is broken by faults between Browsholme and Knowlemere, which bring the Millstone Grit down to the Hodder near Knowlmere. The views of the Ingleborough chain from Bowland Knotts (Millstone Grit) are exceedingly fine on a clear day, and some interesting instances of ice-drift may be seen there.

BOTANY.—The Botanical section will be officially represented by its President, Mr. M. B. Slater, F.L.S., and its Secretaries, Messrs. John Farrah, J. J. Marshall, and Charles Crossland.

Mr. J. F. Pickard writes that the district is remarkably good for wild flowers, and he has found a great number of plants within the last few years which were not noticed before. Dunnow Cliff and Wood, between Slaidburn and Newton, have a large variety of limestone plants, such as *Helianthemum vulgare*, *Potentilla verna*, *Viola hirsuta*, *Rhamnus catharticus*, *Euonymus*, *Scabiosa columbaria*, *Agrimonia eupatoria*, *Gentiana autumnalis*, *Paris*, *Convallaria*, *Cystopteris*, *Scolopendrium*, etc. In marshy places near the river he has found *Hypericum quadrangulum*, *Myosotis repens*, *Potentilla palustris*, *Sparganium simplex*, and along the river banks *Myosotis sylvatica*, *Iris pseudacorus*, *Trollius*, *Saxifraga granulata*, and *Thalictrum flavum*. Most of the moist meadows and pastures yield *Primula farinosa*, *Valeriana dioica*, *Pinguicula*, *Triglochin*, *Habenaria conopsea*, *Sagina*, *Pedicularis sylvatica*, and *Equisetum sylvaticum*. On the moors and in mountain glens and woods may be found *Trientalis*, *Andromeda*, *Vaccinium oxycoccus*, and *V. vitis idæa*, *Empetrum nigrum*, *Viola palustris*, *Hypericum elodes*, *Limosella aquatica*, *Pedicularis palustris*, *Sanicula europæa*, *Ribes alpinum*, *Menyanthes trifoliata*, *Saxifraga geum*, *Veronica scutellata*, *Polypodium phegopteris*, *P. dryopteris*, *Allosorus crispus*, and *Lycopodium selago*. In the lanes, etc., near Newton, *Tanacetum*, *Veronica montana*, *Prunus padus*, *Sedum acre*, *Chrysosplenium alternifolium*, *Geranium pratense*, *Viburnum opulus*, *Carduus heterophyllus*, *Trifolium medium*, *Asplenium ruta-muraria*, and *A. trichomanes*. By the road to Lancaster, near the Trough of Bowland, are *Campanula hederacea*, *Drosera rotundifolia*, *Hypericum humifusum* and *Narthecium ossifragum*. *Ophioglossum* is abundant and *Botrychium* occasional in the meadows. Furze and broom are uncommon, at any rate near Newton. The moors between the Trough and Whitendale and Newton and Waddington Fells are rich in moor and bog plants. *Osmunda regalis* has been reported as growing in the district, but Mr. Pickard has not seen it. Mr. Marshall Demain has also supplied notes on botany.

Mosses and Hepatics.—Mr. J. F. Pickard says the district is well worth exploring, but that very little is known in this branch.

VERTEBRATE ZOOLOGY.—The Vertebrate section will be represented by one of its Secretaries, Mr. Thomas Bunker.

Mammals.—Mr. J. F. Pickard writes that the Otter is occasionally seen by the Hodder, but Foxes are rarely seen.

Birds.—In the Forest of Bowland, the Buzzard, Raven, Merlin, and Peregrine may still be occasionally found. Mitchell's 'Birds of Lancashire' says the Goshawk used to occur. By the Hodder, the Wood Wren, Garden Warbler, and Blackcap, seem to be common. The Woodcock has been known to breed here several times. There was a heronry at Browsholme Hall, which seems to have been deserted in 1888; there is one near Slaidburn now. The Coot and Water-Rail have bred at Browsholme. In a list supplied by Mr. J. F. Pickard there are mentioned Green Woodpecker, Long-eared Owl, Kingfisher, Marsh Tit, Stonechat, Stock-dove, and Brambling (in winter). It will be interesting for members to procure evidence concerning Chiff-chaff, Pied Flycatcher,, Lesser Whitethroat, Woodpeckers, Dunlin, and perhaps Grasshopper and Reed Warblers. The Wryneck has occurred near Mytton.

Reptiles and Fishes.—Mr. J. F. Pickard reports that Lizards, Toads, and Frogs are rare about Newton. The Slow-Worm has occurred, but no Snakes. The Natterjack Toad is recorded for the neighbourhood of Mytton; Mr. Thos. Altham says the last he saw was near Eddisford Bridge eight or nine years ago. He has since turned out some from the neighbourhood of Southport, but they seem to have disappeared. Mr. Thistlethwaite records Salmon, Trout, Minnow, Eel, and possibly Lampern.

CONCHOLOGY.—Mr. W. Denison Roebuck, F.L.S., writes that the Bowland district ought to be rich in mollusca, with its limestone formations and patches of woodland, but no one appears to have collected there except himself, in 1885, along a line extending from Mytton through Bashall Eaves to Whitewell, thence to Dunsop, Newton, Slaidburn, and by Stocks and Tosside to Long Preston. *Vertigo edentula* occurred in Bashall Moor Wood, *Limnæa palustris* in a dry roadside ditch near Cracow Hill, *Zonites fulvus* at Coat Rakes Bridge, *Arion subfuscus* at Hammerton Hall, *Balea* commonly at Slaidburn, *Helix sericea* at Angerham and Meanley, *Azeca tridens* v. *crystallina* at Whitewell, *Z. glaber* at Whitewell and Great Mytton, and *Planorbis spirorbis* in a horse-trough at Grunsagill Bridge, while *Helix rupestris*, *H. arbustorum*, *Clausilia laminata*, *Z. radiatulus*, etc., were common on the limestone. The species of general distribution collected were *Z. nitidulus* (with one of var. *nitens* at Stocks), *Z. purus* and var. *margaritacea*, *Helix hispida* and var. *hispidosa*, *H. hortensis*, *Z. alliarius*, *Zua*, *H. rufescens*, *Limnæa peregra*, *L. truncatula*, *Ancylus fluviatilis*, *Agriolimax agrestis*, *Z. cellarius*, *Z. crystallinus*, *Clausilia rugosa*, *Arion ater*, *A. hortensis*, *A. circumscriptus*, *A. minimus*, *Pupa cylindracea*, and *H. rotundata*.

ENTOMOLOGY.—The Entomological section will be officially represented by Mr. Leonard Hawkesworth (who has, since the card was printed, accepted office as Secretary for Coleoptera).

Mr. J. F. Pickard writes that the following Butterflies are fairly represented: *Pieris brassicæ*, *P. rapæ*, *P. napi*, *Euchloe cardamines*, *Hipparchia tithonus*, *Cænonympha pamphilus*, *Cynthia cardui*, *Vanessa atalanta* and *V. urticæ*, *Chrysophanus phlæas*, *Polyommatus alexis*. Amongst the moths are *Macroglossa stellatarum*, *Hepialus humuli*, *Chelonia caja*, *Bombyx quercus*, *Saturnia pavonia-minor*, *Rumia cratægata*, *Abraxas grossulariata*, *Thyatira batis*.

WORK TO BE DONE by members who have no special object of investigation. **Worms** (especially the small aquatic and mud-haunting species) to be collected and sent to Rev. Hilderic Friend, 7, Fern Bank, Cockermouth; **Diptera** to P. H. Grimshaw, F.E.S., 26, Montpellier Park, Edinburgh, or R. H. Meade, 1, Mount Royd, Manningham; **Orthoptera, Trichoptera, Neuroptera,** to G. T. Porritt, F.L.S., Crosland Hall, Huddersfield; and Tubes of Water containing **Freshwater Algæ,** to W. West, F.L.S., 15, Horton Lane, Bradford.

PROGRAMME OF MEETINGS.—

5-30 p.m.—Meat Tea, 2/- each
6-15 p.m.—Sectional Meetings
6-30 p.m.—General Meeting

} At the Black Horse Hotel, Hellifield.

Train leaves Hellifield for Skipton and south at 7-48 p.m.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Hon. Secretary for this Meeting:

Rev. C. D. ASH, B.A., Skipwith Vicarage, Selby.

THE 124TH MEETING

Will be held at

SELBY,

For the investigation of

Skipwith Common,

On SATURDAY, June 20th, 1896.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all Yorkshire, Lincolnshire, and Durham stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Selby, Riccall, Escrick, Cliff Common, Hemingbrough or Stamford Bridge, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday or Saturday, June 19th and 20th, will be available for return any day up to Monday, June 22nd. Stamford Bridge tickets are available for return from Escrick and Selby.

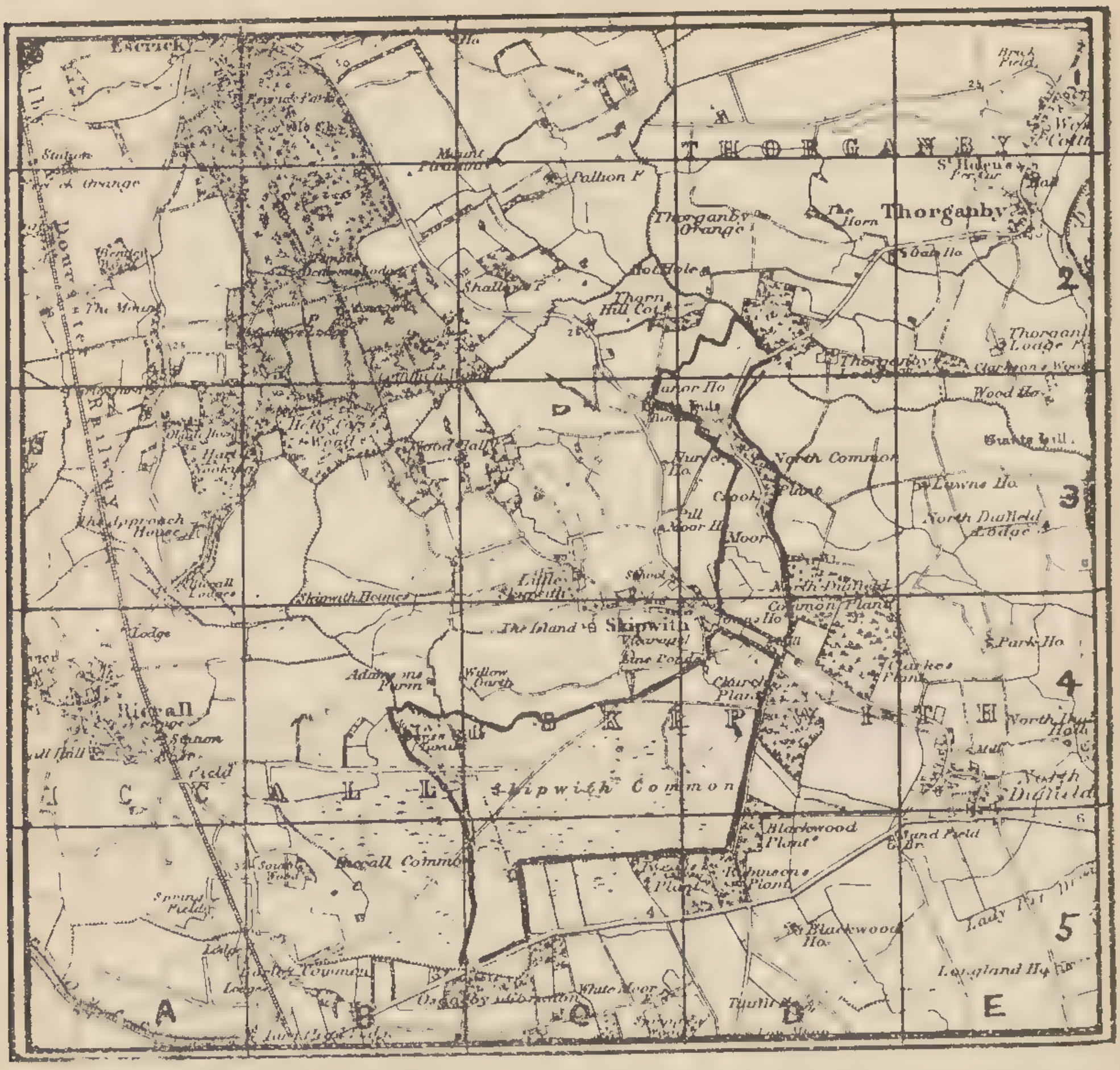
BOOKS AND MAPS.—The district for investigation is included in Sheet 71 (formerly 93 S.W.) one-inch Ordnance Map, and the geological route also in Sheet 63 (93 N.E.) (both published geologically coloured, as also are the six-inch Sheets 206 and 207, but the Drift edition alone is of any use). Reference may be made to papers by Dr. H. F. Parsons on the Alluvial Strata of the Lower Ouse Valley (Proc. Y.G. and Pol. Soc., 1877), and on the Trias of the Southern Part of the Vale of York (op. cit., 1879) by P. F. Kendall on the Glaciation of Yorkshire (op. cit. 1893); and by Rev. C. D. Ash on the Lepidoptera of Skipwith (Nat., Mch. 1895, p. 83, and Mch., 1896, p. 85).

PERMISSION to visit their properties has been kindly granted by Lord Wenlock, Mr. Riley Briggs, and Messrs. J. G. and C. Parker-Toulson.

HOTEL ACCOMMODATION.—Members will find ample accommodation at the Londesborough Arms Hotel, Selby.

THE DISTRICT for investigation is the large heathy tract known as Skipwith Common (out-lined on the map in black); the Holly Carrs Wood on the outskirts of Escrick Park, and the Park itself. Naturalists requiring woodland species should take the latter route.

FRIDAY'S ROUTES.—Entomologists can have an evening's collecting on the common (Lepidopterists bringing sugar and lamps). Leave Selby 6-24 p.m., arrive Riccall 6-33; follow made road to edge of common, where Rev. C. D. Ash will meet any who have previously signified to him their intention to come. A Selby member has kindly offered to drive members back to Selby after the night's work. Those who wish to avail themselves of this privilege must send notice to Rev. C. D. Ash, Skipwith, **not later** than Thursday morning's post.



EXPLANATION.—The Map is divided into square miles by horizontal and perpendicular lines. The present extent of open common is shown by a thickened line ; it will be seen to consist of two separate portions, one of which (the Back Common) extends northwards from the village.

SATURDAY'S ROUTES.—

1.—Skipwith Common. Members arriving at Riccall, 10-34 a.m., will make their way on to the common, and will be met at the edge of the common by Rev. C. D. Ash and Mr. W. Hewett. Later trains to Riccall at 12-44 p.m. and 1-59 p.m.

2.—Holly Carrs Wood, Escrick Park. A keeper will be at Riccall Station at 10-34 a.m. to conduct this party. Naturalists requiring woodland species should take this route.

3.—Mr. Cheesman will lead a party starting from Selby Railway Station at 9-30 a.m., along the banks of the Ouse to Barlby Bridge, thence by road to Skipwith Common. Lepidopterists proceeding by this route are recommended to try the small woods adjoining Market Weighton road, close to edge of Skipwith Common.

4.—Geological ; Mr. Percy F. Kendall, F.G.S., will lead a party to see the Moraines of the York plain, leaving Stamford Bridge station at 9-27 a.m., and walking to Escrick, in time for the 5-14 p.m. train to Selby. Mr. J. W. Stather will arrange **(if desired)** for a waggonette to meet the 11-10 a.m. train from Hull and Market Weighton, and overtake the geologists about High Calton. Geologists coming in the afternoon may meet the party at Wheldrake by taking the 1-50 p.m. train at Selby for Escrick, and walking from that place to Wheldrake.

CAUTION AS TO USE OF LIGHTS on Friday's route and Saturday's route 1.—Members are requested to be very careful in the use of lights on Skipwith Common, as several serious fires have occurred recently, and permission to explore the Common is only given on this condition. The nests and eggs of game and wild fowl nesting on the Common must not be molested.

GEOLOGY.—The Geological section will be represented by its President, Mr. P. F. Kendall, F.G.S., and one of its Secretaries, Mr. J. W. Stather, F.G.S.

Mr. P. F. Kendall, F.G.S., writes :—The district does not at the first glance at the geological map strike one as possessing many attractions. No solid rock is exposed at the surface nearer than the edge of the Wolds or the little isolated hills of Trias near Selby. The drift deposits are, however, of exceptional, almost of unique interest. Two great sub-parallel ridges of boulder-clay, sand and gravel extend in crescentic form from the neighbourhood of Stamford Bridge respectively through York and Escrick round to Bilbrough. These have been recognised as successive terminal moraines of a great glacier that occupied the Vale of York. Sections at various places have yielded characteristic erratics such as Shap Granite, the Quartz-Porphyry of Threlkeld near Keswick, the Carrock Fell Diorite and Scottish granites, which indicate probably the remote sources from which the ice emanated. With these far-travelled rocks are many stones derived from localities within the County of York, for example the Carboniferous Rocks of Wensleydale, and the Triassic Rocks of the Vale of York itself. There are but two breaches in the southern crescent, viz. :—The one through which the Derwent flows and that by which the Ouse comes out into the great alluvial plain north of the Humber. The low ground between and beyond the moraines is mainly occupied by a kind of warpy clay which has been regarded as the fine washings from the glaciers. The late Professor Carvill Lewis supposed that a great extra-morainic lake occupied all the low-lying region beyond the Escrick moraine. This and other questions may fitly occupy the attention of geologists. No organic remains have been found in the clays but it seems probable that a systematic search would be rewarded.

BOTANY.—The Botanical section will be officially represented by its President, Mr. M. B. Slater, F.L.S., and one of its Secretaries, Mr. John Farrah.

Mr. W. Norwood Cheesman and Dr. H. Franklin Parsons write that June is, perhaps, the best month for botanists in this district, and some rare and interesting plants and a large total may be expected for the day's work. The best botanical route is for about two miles along the river side past Barlby to Turn Head, thence by road to the Common. *Pimpinella magna* grows abundantly along the roadside, whilst *P. saxifraga*, the common species, is absent. *Orchis ustulata* should be looked for. *Allium scorodoprasum* and *A. oleraceum* var. *carinatum* and perhaps another species will be in full character for determination. The Barlby ponds require some little time for examination—here are found *Lysimachia vulgaris* and *Lythrum salicaria*. *Lemna minor* flowers here nearly every year. Some of our most experienced botanists have not seen this plant in flower. In case the time is too early the guide will send specimens by post to those desiring some when the flowers appear. *Riccia natans* (the floating Hepatic) is very plentiful, but *R. fluitans* wants confirmation for this station. Proceeding along the bank is seen *Tragopogon pratensis* bearing the fungus *Puccinia tragopogi*. *Colchicum autumnale* (fruiting), *Campanula glomerata*, and *C. latifolia*. Of this latter plant Thos. Johnson, in his edition of Gerard's Herbal, 1633, says: 'I have seen this plant growing on the banks of the Ouse between York and Selby, the place where I was born.' Near Turn Head the following should be recorded : *Thalictrum flavum*, *Saponaria officinalis*, *Humulus lupulus*, *Aquilegia vulgaris* (probably not native).

The character of the Common is undergoing a change on account of partial enclosure and cultivation, and the plants seen to-day may be totally exterminated a few years hence. The following plants will give some idea of the nature of the ground and the class of work which may be looked for. viz :—*Corydalis claviculata*, *Gentiana Pneumonanthe*, *Pinguicula*, *Hypericum elodes*, *Drosera rotundifolia*, (*D. anglica* and *D. intermedia* have been reported), *Cornus sanguinea*, *Bidens cernua*, *B. tripartita*, *Menyanthes*, *Anagallis tenella*, *Listera ovata*, *Habenaria chlorantha*, *Arctium majus*, *Stellaria glauca*. About the ponds near Skipwith are found *Mentha pulegium* and *Helosciadium repens*. If time at Riccall permits specimens may be gathered of *Chelidonium majus* and *Rumex maritimus*. The district is not rich in ferns, the rarer ones being *Osmunda*, *Botrychium*, *Ophioglossum vulgatum*, and *Lastrea oreopteris*. *Asplenium Ruta-muraria* grows on the walls of Skipwith Church-yard. *Pilularia globulifera* was growing a few years ago but has not been seen lately. There is much good work to be done by advanced botanists in the genera Rubus, Rosa, Hieracium and Salix.

Mosses.—Mr. Cheesman notes that cryptogamic botanists will find plenty of work on the Common and in the surrounding woods. Although very imperfectly

worked nearly one hundred species of mosses are recorded, including *Sphagnum cuspidatum*, *S. compactum*, *S. contortum*, *S. tenellum*, and four commoner species. *Leucobryum glaucum*, *Ulota intermedia*, *Aulacomnium androgynum*, *A. palustre*, *Tetraphis pellucida*, *Pogonatum aloides*, *Polytrichum piliferum*, *Fissidens viridulus*, *Cinclidotus fontinaloides* (in River Ouse), *Climacium dendroides*, *Plagiothecium elegans*, *P. undulatum*, *Hypnum imponens*, *H. stramineum*, *H. scorpioides*.

Hepatics.—The most noteworthy are *Jungermannia inflata*, *Lophocolea bidentata*, *Chiloscyphus polyanthus*, *Ptilidium ciliare*. *Riccia glauca* and the two aquatic *Riccias* already noted with the flowering plants.

Mr. M. B. Slater, F.L.S., remarks that the very rare Hepatic *Scalia Hookeri* is recorded from Barmby Moor, near Pocklington, where it was gathered many years ago by the late Dr. Spruce; and as Skipwith Common will probably be a tract of similar heathery ground, this rare Hepatic should be looked for.

Lichens.—Little is known except *Cladonia* (three or four species), *Cetraria aculeata*, *Platysma glaucum*, *Parmelia physodes*, *Lecidea decolorans*.

Algæ.—The recorded list is very small and much work is required. *Batrachospermum moniliforme*, *Chætophora elegans*, *Cladophora glomerata*, *Conferva capillaris*, *Spirogyra quinina* have been found. The Common is rich in Desmids but no list has yet been made, and nothing whatever is known of the Diatomaceæ except a few of the commonest species.

VERTEBRATE ZOOLOGY. The Vertebrate section will be represented by its Secretaries, Messrs. Thomas Bunker and Oxley Grabham, M.B.O.U.

Mammals.—Rev. C. D. Ash, B.A., notes that the Fox, Hare, Rabbit, Stoat, and Weasel are known to occur, so there is ample scope for research.

Birds.—Rev. C. D. Ash, B.A., notes that the Long-eared Owl, Black-headed Gull, Snipe, Redshank, Mallard, Teal, Coot, Waterhen, Nightjar, etc., breed on or near the Common.

Reptiles and Fishes.—Rev. C. D. Ash, B.A., notes that the Lizard occurs commonly on the Common, also that the Viper and Stickleback are found.

CONCHOLOGY.—The Conchological section will be officially represented by its Secretary, Mr. F. W. Fierke. The President of the Section, Mr. H. Crowther, F.R.M.S., may possibly also be present.

There are no mollusca to be found on the Common itself, but the woods at Escrick and the banks of the Ouse from Barlby to Kelfield will well repay search.

ENTOMOLOGY.—The Entomological section will be officially represented by its President, Rev. C. D. Ash, B.A., and two of its Secretaries, Messrs. A. E. Hall, F.E.S., and Wm. Hewett.

Lepidoptera.—Rev. C. D. Ash notes that the district is fairly rich in macro-lepidoptera and some pretty good species are to be found on the Common, notably *Acronycta leporina*, *A. menyanthidis* (a very dark form), and *Notodonta dictæoides*. *Scodiona belgiaria* occurs in the larval stage in the spring, and the imago might be worked for with advantage. Among the micro-lepidoptera there is much to be done—especially among the *Tortrices*, and it is hoped that even those who do not collect the group will box all the specimens they see for identification. The Holly Carrs Wood produces a large number of common woodland species, but has not been worked very closely except in the spring; and careful investigation is desirable. Among insects generally to be obtained in the daytime on the Common are *Euthemonia russula*, *Lithosia mesomella*, and several species of Crambites. Given favourable weather a good 'bag' should be made at sugar on Friday night.

WORK TO BE DONE by members who have no special object of investigation. **Worms** (especially the small aquatic and mud-haunting species) to be collected and sent to Rev. Hilderic Friend, 7, Fern Bank, Cockermouth; **Diptera** to P. H. Grimshaw, F.E.S., 26, Montpellier Park, Edinburgh, or R. H. Meade, 1, Mount Royd, Manningham; **Orthoptera, Trichoptera, Neuroptera,** to G. T. Porritt, F.L.S., Crosland Hall, Huddersfield; and Tubes of Water containing **Freshwater Algæ,** to W. West, F.L.S., 15, Horton Lane, Bradford.

PROGRAMME OF MEETINGS.—

5-30 p.m.—Meat Tea, 2/- each
6-30 p.m.—Sectional Meetings
7-0 p.m.—General Meeting

} All at the Londesborough Arms' Hotel, Selby.

The Chair will be occupied by the President of the Union.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Ex-Presidents:

REV. WM. FOWLER, M.A., Liversedge.
H. CLIFTON SORBY, LL.D., F.R.S., etc., Sheffield.
JOHN GILBERT BAKER, F.R.S., F.L.S., Kew.
RT. HON. LORD WALSINGHAM, M.A., F.R.S., Thetford, Norfolk.
REV. W. H. DALLINGER, LL.D., F.R.S., etc., London.
SIR RALPH PAYNE-GALLWEY, BART., M.B.O.U., Thirkleby Park.
WILFRID H. HUDLESTON, M.A., F.R.S., Weybridge.
HENRY EELES DRESSER, F.L.S., F.Z.S., London.
RT. REV. WM. WALSHAM HOW, D.D., Lord Bishop of Wakefield.
PROF. A. H. GREEN, M.A., F.R.S., F.G.S., Oxford University.
CHAS. P. HOBKIRK, F.L.S., Dewsbury.
R. H. TIDDEMAN, M.A., F.G.S., H.M. Geol. Survey, Bridgend.
ROBERT BRAITHWAITE, M.D., F.L.S., London.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Hon. Secretaries for this Meeting:

HARRY MOORE, The Museum, Rotherham;
JOHN HOWITT, 12, Whiston Grove, Rotherham.

THE 125TH MEETING

Will be held at

ROCHE ABBEY

For the investigation of

Maltby Common & Woods,

On SATURDAY, July 11th, 1896.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all stations on the G.N., H. & B., L. & Y., L. & N.W., M., S. & L., Midland, and N.E. Railways, which have booking arrangements for Rotherham or Masborough, to Members and Associates of the Y.N.U. producing their signed card of membership. Tickets taken on Friday or Saturday, July 10th or 11th, will be available for return any day up to Tuesday, July 14th.

HOTEL ACCOMMODATION.—Members will find accommodation at the White Swan Inn, Maltby, and the Black Lion Inn, Firbeck. Private lodgings might also be obtained at some of the cottages in Maltby for a limited number of visitors desiring to prolong their stay for a few days; but no definite information can be given on this point.

PERMISSION to visit their properties has been kindly granted by the Earl of Scarborough and the Rev. H. G. Jebb, M.A., J.P., Firbeck Hall. The garden and grounds at Firbeck will be open for the inspection of the members.

BOOKS AND MAPS.—The district for investigation is included in Sheet 82 N.E. one-inch Ordnance Map (also published geologically coloured, as also are the six-inch Sheets 290 and 296). Reference may be made to Bohler's list of plants given in Aveling's History of Roche Abbey.

CIRC. No. 125.

A
B
C
D
Grange Quarter
Malthby Stone Pits
Malthby Wood Ho.
Castle Lodge Quarries
Malthby Common
Lane Bank Hole
Barn
Hell Wood Ho.
Hell Wood
Abbey Lees Farm
Roche Abbey Quarries
Scotch Spring Quarry
Scotch Spring Wood
Limestone Quarry
Limestone Quarry
Limestone Quarry
Sandbeck Lodge
Long Plantation
Stone Mill
Rein Park Plant.
Stubbing Wood
Limestone Quarry
Limestone Quarry
Dales Wood
Lingoed Hill
Lingoed Wood
Aldred Field
Tinsdale Plant.
Nursery
Nursery Wood
Bridle Path
Lime Kiln Hill
165
Lime Stone Quarry
Crooked Lane
Head
Limestone Quarry
Boulby Butts
Wood
Cuckoo Hall
Lane
South Wong
Folds
Field Wood
Hill
Cover
Four Lane End
Plantation
Limestone Quarry
Old Wood
Firbeck
Park Hill
Sale Hill
Plantation
Haven Wood
Sir Henrys Plant.
Limestone Quarry
Limestone Quarry
Lepwell
Kennel
Wood
Limestone Quarry
Kennel
Thunbow Hill
Kennel Lodge
Sandbeck Hall
Woodthwaite
Long Stone Wood
Lamb Lane
Road
Nursery Wood
Manor Farm
The
Kennel
Keepers
Water Hill
Farm
Wood
Dysons
Wood
Cover
Park
Union Wood
Keepers
Kennel
Lodge
Woodthwaite
Bridge Wood
Lingoed Wood
Lingoed Hill
Quarry
Quarry
Quarry

CONVEYANCES will start from the Ship Hotel Yard, Rotherham, at 10-15 a.m., reaching Maltby Woods about 11-30 a.m. Return fare 2/-.

☞ It is earnestly requested that the members visiting the woods confine themselves to the rides, which are numerous and ample.

GEOLOGY.—

The late Mr. H. D'Oyley Foote wrote on the occasion of the Union's last visit that immediately above the Abbey is a quarry in the lower magnesian limestone, many old workings in which afford good sections. The stone has a very fine white and crystalline appearance, and is rather soft in the lower beds. A fresh fracture of it has a particular sparkling lustre like lump sugar, but soon loses this on exposure. Along the brook from Maltby to Roche Abbey good sections are to be seen, and at Hooton Levitt Mill it cuts right through to the underlying coal measures. In the lower magnesian limestone of this district, fossils are exceedingly scarce, and it is only in some few localities that they occur. At Toe Lane, Laughton, Brookhouse and Carr Quarries have been found *Terebratula elongata*, *Productus horridus*, *Monotis speluncaria*, *Bakerellia ceratophaga*, *Pleurotomaria antrina*, *Turbo*, and a few others.

BOTANY.—

Flowering Plants.—Mr. H. Moore writes that the following plants are to be seen in bloom in July, about Maltby Common and Woods, Roche Abbey and Firbeck :—*Clematis vitalba*, *Chelidonium majus*, *Cerastium arvense*, *Arenaria trinerva*, *Alsine tenuifolia*, *Hypericum montanum*, *Ononis spinosa*, *Euonymus europæus*, *Anthyllis vulneraria*, *Astragalus glycyphyllos*, *Onobrychis sativa*, *Poterium sanguisorba*, *Rubus macrophyllus*, *R. leucostachys*, *R. cæsius*, *Ribes alpinum*, *Hippuris vulgaris*, *Myriophyllum spicatum*, *Epilobium angustifolium*, *Callitriche vernalis*, *Circæa lutetiana*, *Sedum reflexum*, *Bupleurum rotundifolium*, *Pimpinella magna*, *Peucedanum sativum*, *Galium tricorne*, *Asperula cynanchica*, *Scabiosa columbaria*, *Eupatorium cannabinum*, *Inula conyza*, *Gnaphalium dioicum*, *Senecia erucifolius*, *Carduus eriophorus*, *Picris hieracioides*, *Latuca muralis*, *Pyrola minor*, *Centunculus minimus*, *Ligustrum vulgare*, *Chlora perfoliata*, *Lithospermum officinale*, *Echium vulgare*, *Verbascum thapsus*, *Linaria elatine*, *Veronica montana*, *Antirrhinum orontium*, *Mentha sativa*, *Origanum vulgare*, *Thymus chamædrys*, *Calamintha clinopodium*, *Humulus lupulus*, *Neottia nidus-avis*, *Ophrys apifera*, *O. muscifera*, *Habenaria chlorantha*, *Gymnadenia conopsea*.

Mosses and Hepatics.—The following are recorded from Roche Abbey in Lees' West Riding Flora: *Eucladium verticillatum*, *Ditrichum flexicaule*, *Barbula rigidula*, *B. convoluta*, *B. tortuosa*, *B. intermedia*, *Ulota intermedia*, *Orthotricum affine*, *Bryum pseudo triquetrum*, *Mnium stellare*, *Rhynchostegium tenellum*, *Hypnum chrysophyllum*, *Frullania dilatata*, *Lejeunea serpyllifolia*, *Porella platyphylla*, *Jungermania bicrenata*.

Lichens.—No records.

Fungi.—There are no records, and Mr. Charles Crossland will be glad to receive specimens for identification.

Algæ.—No records.

Microscopic Life.—Mr. H. Moore writes that the following have been taken from Laughton Pond, Roche Abbey, during this year, viz. :—*Melicerta ringens*, *Stephanonceros eichornii*, *Oscistes crystallinus*, *Floscularia ornata*, *Cothurnia imberbis*, *Stentor polymorphos*, *Ophrydium sessile*, *Arcella aculeata*, *Difflugia proteiformis*. For information respecting the **Diatomaceæ** of Roche Abbey reference may be made to Dr. Lees' 'Flora of West Yorkshire.'

VERTEBRATE ZOOLOGY.—The Vertebrate section will be represented by one of its Secretaries, Mr. Thomas Bunker, and by the President of the Union, Mr. John Cordeaux, M.B.O.U.

Mr. F. W. Dickinson writes the following :—

Mammals.—The Fox is common in the woods, being preserved ; the Water Vole is plentiful ; the Squirrel, Dormouse, Stoat and Weasel are found in the woods. The Greater Horseshoe Bat has occasionally been found in great numbers.

Birds.—The birds are numerous and include most of the woodland species. The Kestrel and Sparrow-Hawk are not numerous, being destroyed by the keepers in the interests of the pheasants. A large colony of Jackdaws inhabit, and breed in, the ruins of Roche Abbey. The Wood Owl breeds regularly in the surrounding woods. The Green and Great Spotted Woodpecker is occasionally found. The Grey Wagtail is seen all the year round; but I have not been able to find its nest. In King's Wood and Grange Wood the Hawfinch is fairly abundant and breeds there, no doubt attracted by the number of yew trees, the seeds of which form part of its food. The Nightingale is also found, but is not plentiful. The Nuthatch is frequently seen and heard, and breeds in the woods. The only two specimens of the Bittern killed in this neighbourhood were shot within one hundred yards of each other, in the stream at the end of the Norwoods, though at an interval of several years. The Turtle Dove is common. The Coot and Mallard breed in Laughton Pond, where the Heron is a frequent visitor. The Great Crested Grebe sometimes breeds on Sandbeck Ponds, and has been seen in full breeding plumage on Laughton Pond.

Reptiles and Fishes. -The Ringed Snake is sometimes met with, and more rarely the Adder and Slow-worm. The stream and lake are fairly supplied with Trout, and there are Perch and Roach in the stream at Roche Abbey. The common Lizard is also found on Woodlea.

CONCHOLOGY.—The woods and the neighbourhood of Maltby and Roche Abbey will be found productive of sylvan and limestone-haunting species, but very little has been done in the way of collecting in the district.

ENTOMOLOGY.—The Entomological section will be officially represented by one of its Secretaries, Mr. A. E. Hall, F.E.S.

Lepidoptera.—Mr. J. N. Young writes that the following are found in July, about Roche Abbey, &c., viz. :—**Butterflies**—*Vanessa io, V. cardui, Arge galatea, Satyrus ægeria, S. tithonus, S. hyperanthus, Thecla quercus, T. W-album* (common in larval state on elms in June), *Syrichthus alveolus, Hesperia sylvanus*, besides common ones. **Geometræ**—*Urapteryx, Epione advenaria, Metrocampa, Crocallis, Boarmia repandata, Geometra papilionaria, Asthena sylvata, Eupisteria, Macaria liturata, Abraxas ulmata, Ligdia, Lobophora hexapterata, Melanthia rubiginata, M. ocellata, M. albicillata, Melanippe hastata, Cidaria corylata, C. immanata, C. fulvata, C. pyraliata, Anaitis plagiata, Tanagra, Platypteryx falcula.* **Noctuæ**—*Thyatira derasa, T. batis, Bryophila perla, Xylophasia hepatica, X. scolopacina, Mamestra anceps, Triphæna janthina, T. fimbria, Orthosia suspecta, Hadena adusta, H. dentina, H. suasa, H. pisi, Heliodes arbuti.* **Larvæ** of *Smerinthus ocellatus, S. populi, Euchelia jacobææ, Arctia mendica, A. menthastri, Pœcilocampa populi, Citix spinula, Dicranura bifida, D. vinula, Pygæra bucephala, Notodonta dictæa, N. dictæoides, Acronycta megacephala. A. alni, Agrotis saucia, Taniocampa populeti, T. munda, Scopelosoma satellitia, Euperia fulvago, Dianthœcia carpophaga, D. cucubali, Miselia oxyacanthæ* and *Brephos parthenias.*

Coleoptera.—No information available.

Other Orders.—No records.

WORK TO BE DONE by members who have no special object of investigation. **Worms** to be collected and sent to Rev. Hilderic Friend, 7, Fern Bank, Cockermouth; **Diptera** to P. H. Grimshaw, F.E.S., 26, Montpellier Park, Edinburgh, or R. H. Meade, 1, Mount Royd, Manningham; **Orthoptera, Trichoptera, Neuroptera,** to G. T. Porritt, F.L.S., Crosland Hall. Huddersfield; Tubes of water containing **Freshwater Algæ,** to W. West, F.L.S., 15, Horton Lane, Bradford; **Spiders** to Rev. F. O. Pickard-Cambridge.

PROGRAMME OF MEETINGS.—

4- 0 p.m.—Meat Tea, 2/- each,
4-45 p.m.—Sectional Meetings } All at the Lodge, Roche Abbey.
5-30 p.m. —General Meeting
6-30 p.m.—Conveyances will leave Roche Abbey for Rotherham.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Hon. Secretary for this Meeting:

Rev. JOHN HAWELL, M.A., Ingleby Greenhow Vicarage, Middlesbrough.

THE 126TH MEETING

Will be held at

STAITHES,

For the investigation of

THE NEIGHBOURING COAST,

AND

THE EASINGTON AND ROXBY WOODS,

ON

Bank Holiday Monday, August 3rd, 1896.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all stations on the G. N., H. & B., L. & Y., L. & N. W., M. S. & L., Midland, and N. E. Railways which have booking arrangements for Kettleness, Hinderwell, Staithes, Easington, or Loftus, to Members and Associates of the Y.N.U. producing their signed card of Membership. Tickets taken on Friday, July 31st, or Saturday, August 1st, will be available for return up to Tuesday, August 4th. Where through bookings are not in operation, members may book to most convenient junction, and re-book to destination, the reduced fares being available for each stage of the journey.

HOTEL ACCOMMODATION.—Members desiring accommodation should communicate with Mr. James Spink, Station Hotel, Staithes, R.S.O., Yorks.

BOOKS AND MAPS.—The district for investigation is included in Sheet 104 S.W. (New Series Sheet 34) one-inch Ordnance Map (also published geologically coloured), and almost entirely falls within the limits of Sheet 19 of the six-inch Map, but a small portion is in Sheet 18. Reference may be made to Tate and Blake's 'Yorkshire Lias,' Phillips' 'Geol. Yorks. Coast,' Young and Bird's 'Geol. Survey of Yorks. Coast.'

PERMISSION to visit their properties has been kindly granted by Sir Chas. M. Palmer, M.P. and Capt. Turton, and by Mr. Samuel Broune (Shooting Lessee).

THE DISTRICT for investigation includes the coast-line from Runswick Bay to Boulby Cliff, and the wooded glens, the drainage of which falls into Staithes Beck.

SATURDAY'S ROUTES.—The Members who arrive on the Saturday will explore the neighbourhood under the leadership of Mr. R. Barnes and Mr. Kenneth McLean. Those who intend to arrive on the Saturday should communicate with Mr. R. Barnes, The Gardens, Saltburn-by-the-Sea.

MONDAY'S ROUTES.—Low tide about 4 p.m.

1.—Members arriving at Easington by train from South at 10-29 a.m., or train from North at 11-6 a.m. will leave Easington Station on the arrival of the latter train and work the glens towards Staithes under the leadership of Mr. Kenneth McLean.

2.—Members arriving at Staithes by train at 1-30 p.m. from the North, or 2-0 p.m. from the South will leave Staithes Station on the arrival of the second train and work as far up the glens as time permits. Leaders, Mr. W. H. Thomas and Mr. T. F. Ward.

3.—The Geological party will leave Easington Station on the arrival of the train from the south at 9-9 a.m., and will proceed, under the leadership of Mr. P. F. Kendall, F.G.S., and Mr. W. Y. Veitch, M.R.C.S., to the Boulby Alum Works. Returning to Easington Station at 1-21 p.m., they will proceed to Hinderwell, where they will be joined by a later contingent, and will walk to Runswick Bay, and thence up the shore to Staithes.

THE YORKSHIRE GEOLOGICAL AND POLYTECHNIC SOCIETY have organized an Excursion on Friday and Saturday, July 31 and August 1, for the examination of the Coast Sections between Blea Wyke and Whitby under the leadership of Mr. P. F. Kendall, F.G.S., Dr. W. Y. Veitch, and Rev. J. Hawell, M.A., with a Meeting at Whitby on Saturday evening. Monday's geological route, given above, is planned in continuation of these arrangements.

GEOLOGY.—The Geological section will be represented by its President, Mr. P. F. Kendall, F.G.S., and its Secretaries, Rev. W. Lower Carter, M.A., F.G.S, and Mr. J. W. Stather, F.G.S.

Mr. C. Fox-Strangways, F.G.S., of the Geological Survey, has furnished the following notes :—Commencing at the northern end of the area under examination, we first meet with the thin limestones and oyster bands that are seen on the shore opposite Redcar, and which constitute the zones of *Am. angulatus* and *Am. bucklandi* of the Lower Lias.

The Rhætic beds and the lowest beds of the Lias (zone of *Am. planorbis*) are not exposed here, but have been met with in artificial sections a short distance inland. Proceeding southwards from Redcar the cliff is occupied entirely by glacial deposits till we reach Saltburn, a distance of four miles. At this point the northern escarpment of the Lias strikes the coast, the whole of the Middle Lias and a large part of the Lower Lias being exposed in the precipitous face of Huntcliff.

On the shore here the *jamesoni* beds form extensive scars at low water, while in the cliffs above we have the full thickness of the *capricornus*- and *margaritatus*-beds, the *spinatus*-beds, containing the Main Seam of Ironstone, outcropping just along the edge of the cliff. This section is again repeated at Hummersea where the beds are more accessible, the junction between the Lower and Middle Lias being close to high-water mark. In the magnificent cliffs of Boulby, 600 feet in height, just south of this, there is a complete section from the lower part of the Oolites to the *jamesoni*-beds. A great part of this, from the precipitous nature of the cliffs, is inaccessible, but the higher portion may be reached in the old alum works. These alum works are well worth a visit as showing the large extent of this industry in former times, and as being the locality from which many of the large saurians were obtained. At Staithes the sandy beds of the Middle Lias reach the shore and are regularly succeeded by the Ironstone Series and the lower portion of the Upper Lias. The lower beds here are very rich in starfish, while the beds above, which include the zones of *margaritatus*, *spinatus*, *annulatus*, and *serpentinus*, from their gradually declining to the shore, are very favourably situated for examination.

At Rosedale Wyke a shaft has been sunk to the ironstone, which is here worked below sea-level. South of this a small dislocation repeats some of the beds, so that after crossing the picturesque bay of Runswick we get the Ironstone Series again exposed at Kettleness Point. Here at one time the ironstone was dug on the shore, and sent away by ship to the northern furnaces, a large amount of it having been removed. The coast between Kettleness and Sandsend exhibits a good section of the three divisions of the Upper Lias (the *annulatus*, the *serpentinus*, and the *communis*-beds), but from the sea washing the base of the cliff it is rather a dangerous one to explore. The old jet holes along here form a series of caverns which have a very weird effect.

BOTANY.—The Botanical section will be officially represented by its President, Mr. M. B. Slater, F.L.S., and one of its Secretaries, Mr. J. J. Marshall, and the Mycological Committee by Mr. Chas. Crossland.

Flowering Plants.—Mr W. H. Thomas states that the following are amongst the wild flowers which he has noticed in the neighbourhood :—*Cardamine amara, C. sylvatica, Fumaria capreolata, Stellaria graminea, Epilobium tetragonum, E. hirsutum, E. palustre, Hypericum quadrangulum, H. hirsutum, H. perforatum, Myosotis palustris, Galium verum, Primula elatior, Eupatorium cannabinum, Campanula latifolia, Pedicularis sylvatica, Inula dysenterica, Habenaria bifolia, Orchis morio, Humulus lupulus, Paris, Melampyrum sylvaticum, Tamus communis, Lathræa squamaria, Valeriana dioica, Cochlearia officinalis, Origanum vulgare, Rubus cæsius, Vicia tetrasperma, Plantago maritima, P. coronopus, Veronica montana.* Mr. G. Abbey writes :—There is a naturalised branch of the *Brassica* tribe growing on the cliffs round Staithes, of which it would be interesting to trace the origin.

Mosses and Hepatics.—Mr. R. Barnes writes that, as regards the district for investigation, very little seems to have been done amongst the flowering plants, yet to those interested in bryology it offers many advantages, since it is known to yield such a goodly number of the rarer and less common mosses. Excellent ground for exploration will be found in either the Easington or Roxby Woods, which woods for some considerable distance are separated by quite a narrow ridge of ground. It will be observed that more attention has been given to the Mosses rather than to the Hepaticæ of the district, and as the physical character of the two glens is very similar to many of the Esk tributaries, some good finds in this latter section may reasonably be expected to be made.

The following list contains the rarer species that have been met with together with two or three of the commoner ones rarely gathered in a fruiting condition :—*Gymnostomum tenue, G. microstomum, Weissia mucronata, Dicranella schreberi, D. rufescens, Dicranum fuscescens* var. *falcifolium, Archidium phascoides, Pleuridium nitidum, Campylostelium saxicola, Brachyodus trichodes, Sphærangium muticum, Didymodon cylindricus* (with fruit), *Didymodon sinuosus, Eucladium verticillatum, Trichostomum crispulum, Barbula spadicea, B. cylindrica, B. angustata, Ptychomitrium polyphyllum, Ulota crispula, Orthotrichum stramineum, O. pulchellum, O. leiocarpum, Mnium stellare, M. serratum, Tetrodontium brownianum, Fissidens exilis, F. incurvus, F. fontanus, F. decipiens, Heterocladium heteropterum, Neckera crispa, Pylaisia polyantha, Brachythecium glareosum* (with fruit), *Eurhynchium piliferum* (with fruit), *E. pumilum, E. tecsdalii, Rhynchostegium depressum, Plagiothecium latebricola, Amblystegium irriguum, Cephalozia multiflora, C. catenulata, C. curvifolia*, and in a neighbouring glen *Nardia hyalina, Kantia* and *Cephalozia laxifolia* have been met with.

Fungi.—Mr. Geo. Abbey remarks that there are some old trees near the house at Grinkle Park that will be a suitable host for fungi. Mr. Charles Crossland will be glad to receive specimens for identification.

VERTEBRATE ZOOLOGY.—The Vertebrate section will be represented by its President, Mr. Thos. H. Nelson, M.B.O.U.

Birds.—Mr. T. H. Nelson writes :—Among the rarer birds which have occurred occasionally in the neighbourhood of Grinkle Park are Honey Buzzard, White-tailed Eagle, Hen Harrier, Goshawk, Common and Rough-legged Buzzards, Merlin, Dotterel, Hoopoe, Kingfisher, Turtle Dove and Snow Bunting. The Raven bred on the neighbouring cliffs until thirty years ago. Tawny and Long-eared Owls frequent the woods, as also the Green and Lesser Spotted Woodpeckers, Nuthatch, Creeper, Sparrowhawk, Woodcock, Ring-dove, Stock-dove, Carrion Crow and Kestrel. On the cliffs are Cormorants, Herring Gulls, Jackdaws, Martins and Rock-doves. In the vicinity are found at the proper seasons most of the commoner birds, such as Long-tailed, Blue, Great, Cole and Marsh Tits, Willow Wren, Sedge Warbler, Chiff Chaff, Tree Pipit, Bullfinch, Goldfinch. Siskin, Goldcrest, Jay, Magpie, Waterhen, Common Sandpiper, Ring Ouzel, Dipper, Nightjar, Cuckoo, Golden and Green Plover, Common Snipe, Jack Snipe, Curlew, Twite, Hooded Crow, Short-eared Owl, Heron, Grouse, Partridge, Pheasant, and the usual common birds. Mr. K. McLean notes most of the above birds and also the

Peregrine Falcon. He says:—The coast is a favourite landing place for the winter migrants, Woodcock, Snipe, Fieldfare, Redwing, Short-eared Owl coming in large quantities in September or before. Mr. G. Abbey says:—On the east side of the house at Grinkle Park there was some fine spruce that about August should be visited by Crossbills, at least they used to be, in flocks of a hundred or two. Of **Mammals** Mr. Nelson notes Badger and Otter (occasionally), Foulmart (common once, almost extinct now), Fox, Stoat, Weasel, Hedgehog, Shrew, Long-tailed Field Mouse. **Fishes.**—Messrs. Nelson and McLean state that Salmon-Trout, Trout, and Eels abound in the streams, and that Perch has been introduced by Sir C. M. Palmer.

MARINE ZOOLOGY.—Mr. W. Y. Veitch says—The best local guide upon the subject is Ferguson's 'Natural History of Redcar and Neighbourhood.' Among the more uncommon species of fish noticed about Staithes are *Trigla hirundo*, *Sciæna aquila*, *Brama raii*, *Centrolophus pompilus*, *Lampris guttatus*, *Callionymus lyra*, *Belone vulgaris*, *Brosmius vulgaris*, *Rhombus hirtus*, *Orthagoriscus mola* and *Acipenser sturio*. Dr. Veitch also sends valuable notes of the **Zoophytes, Echinoderms, Crustaceans,** etc., which we are compelled to omit for want of space.

CONCHOLOGY.—

Dr. Veitch mentions the following marine molluscs as those most likely to be met with:—*Pholas dactylus*, *Saxicava rugosa*, *Donax anatinus*, *Tellina crassa*, *Mactra stultorum*, *Tapes pullastra*, *Venus gallina*, *Astarte sulcata*, *Lucina borealis*, *Mytilus edulis*, *Doris tuberculata*, *Bulla cranchii*, *Chiton cinereus*, *Dentalium entale*, *Patella vulgata*, *Helcion pellucidum*, *Trochus cinerarius*, *Littorina littorea*, *Rissoia parva*, *Turritella communis*, *Aporrhais pes-pelicani*, *Cypræa europæa*, *Buccinum undatum*, *Purpura lapillus*, *Murex erinaceus*, and *Loligo vulgaris*; although it does not appear that any records have been actually made for the section of coast to be examined.

Of L. and F.W. Mollusca Mr. Baker Hudson has taken in the neighbourhood *H. nemoralis*, *H. caperata*, *H. hispida*, *H. rotundata*, *H. aculeata*, *H. sericea*, *H. arbustorum*, *H. aspersa*, *Zonites cellarius*, *Z. nitidulus*, *Z. alliarius*, *Z. crystallinus*, *Z. purus*, *Z. radiatulus*, *Clausilia rugosa*, *C. laminata*, *Bulimus obscurus*, *Pupa marginata*, *P. umbilicata*, *Vertigo edentula*, *Zua*, *Azeca*, *Vitrina*, *Limnæa peregra*, *Ancylus fluviatilis*.

ENTOMOLOGY.—The Entomological section will be officially represented by its President, Rev. C. D. Ash, B.A., and its Secretaries, Messrs. A. E. Hall, F.E.S., Wm. Hewett, and Leonard Hawkesworth.

Lepidoptera.—Mr. T. A. Lofthouse notes the following species as occurring in the vicinity of Staithes:—*Vanessa urticæ*, *V. atalanta*, *V. cardui* (common in some seasons), *Epinephele tithonus*, *Polyommatus phlæas*, *Lycæna icarus*, *Bombyx rubi*, *Plusia gamma*, *Peronea variegana*, *Urapteryx sambucaria*. Capt. Turton writes that some twenty years ago he saw a splendid specimen of the Camberwell Beauty butterfly (*Vanessa antiopa*) on Roxby Moor.

Coleoptera.—Mr. M. L. Thompson writes that Coleopterists should sweep grassy places and hillsides in the vicinity of the coast in search of the smaller Clavicornia, as it is at present much to be desired that Yorkshire Coleopterists should direct special attention to this division. Advantage should also be taken of the coast excursion to work the shore itself.

WORK TO BE DONE by members who have no special object of investigation. **Worms** (especially the small aquatic and mud-haunting species) to be collected and sent to Rev. Hilderic Friend, 7, Fern Bank, Cockermouth; **Diptera** to P. H. Grimshaw, F.E.S., 26, Montpellier Park, Edinburgh, or R. H. Meade, 1, Mount Royd, Manningham; **Orthoptera, Trichoptera, Neuroptera,** to G. T. Porritt, F.L.S., Crosland Hall, Huddersfield; and Tubes of Water containing **Freshwater Algæ,** to W. West, F.L.S., 15, Horton Lane, Bradford.

PROGRAMME OF MEETINGS.—

4-15 p.m.—Meat Tea, 2/- each, at the Station Ho Staithes.
5-0 p.m.—Sectional Meetings } At the Board Schoc Staithes.
5-15 p.m.—General Meeting }

The Chair at the General Meeting will be taken by Mr. T H. Nelson.

Yorkshire Naturalists' Union.

President:

JOHN CORDEAUX, M.B.O.U., Great Cotes, Lincolnshire.

Hon. Secretary:

WM. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Hon. Secretary for this Meeting:

W. NORWOOD CHEESMAN, The Crescent, Selby.

Hon. Secretary to the Yorkshire Mycological Committee.

CHARLES CROSSLAND, 4, Coleridge Street, Halifax.

THE 127TH MEETING

Will be held at

SELBY,

FOR A

FUNGUS FORAY,

SATURDAY TO TUESDAY,

SEPTEMBER 19th to 22nd, 1896.

RAILWAY ARRANGEMENTS.—Through return tickets at pleasure party rates will be issued at all stations on the G.N., H. & B., L. & Y., L. & N.W., M., S. & L., Midland, and N.E. Railways, which have booking arrangements for Selby, Hambleton, Escrick, Riccall, and Cliff Common, to Members and Associates of the Y.N.U. producing their signed card of membership. Tickets taken on Saturday, Sunday, Monday, or Tuesday, September 19 to 22, will be available for return any day up to Wednesday, September 22nd.

The Y. N. U. MYCOLOGICAL COMMITTEE, of which Mr. Charles Crossland, 4, Coleridge Street, Halifax, is the Hon. Secretary, will take charge of the whole of the arrangements for this meeting. Mycologists from any part of Britain are cordially invited. The following have signified their intention to be present:—Mr. Geo. Massee, F.R.M.S., F.L.S., Royal Herbarium, Kew; Canon J. M. Du Port, M.A., of Denver, Norfolk; Mr. Carlton Rea, M.A., Worcester; Rev. W. Fowler, M.A.; Mr. H. T. Soppitt, Halifax; Mr. U. Bairstow, Halifax; Mr. J. W. Sutcliffe, Halifax; Mr. A. Clarke, Huddersfield; Mr. J. Needham, Hebden Bridge; Mr. Charles Crossland, Halifax; Mr. Harold Wager, F.L.S., Leeds, etc.

HOTEL ACCOMMODATION.—Members will find ample accommodation at the Londesborough Arms Hotel.

BOOKS AND MAPS.—The district to be investigated is shown on sheets 93 S.E. and 87 N.E. of the One-Inch Ordnance Map. In the 'Naturalist' for Jan., 1885, is an account of a Fungus Foray at Selby, with list of 134 species collected, all in the East Riding portion of the district.

PERMISSION to visit their estates is kindly granted by Lady Beaumont, Lord Wenlock, Lord Londesborough, Mr. Charles Weddall, Mr. Riley Briggs, Mr. J. Lloyd Wharton, M.P., and the Ecclesiastical Commissioners.

MYCOLOGISTS and others interested are cordially invited to attend the excursion and take part in the investigations.

SATURDAY'S ROUTES.—It is proposed to work Stainor Wood (about a mile S. of Selby) in the afternoon, and arrangements will also be made for working Bishop's Wood (rail to Hambleton Station).

Some of the visitors will arrive this day, and in order that arrangements may be made for the afternoon's investigations, members and visitors should advise Mr. Cheesman as to the time they arrive.

MONDAY'S ROUTES.—Escrick Woods (10-25 a.m. train from Selby to Riccall Station), Blackwood and Osgodby Woods to be explored (see map).

MONDAY EVENING :—At 6 p.m. the Yorkshire Mycological Committee will meet to select suitable place for Fungus Foray of 1897, and to consider the constitution of that Committee for 1897.

At 6-30 p.m. **SHORT ADDRESSES** will be delivered as follows :—

By Rev. Canon Du Port, M.A., on 'A Case of Poisoning from eating *Amanita pantherina* at Charleville (Ardennes)'.

By Geo. Massee, F.L.S., F.R.M.S., on 'Some Doubtful Species of *Agaricus*.'

By Carleton Rea, M.A., on 'The Duration of the Sporophore of *Collybia tuberosa* and *Cyathus striatus*.'

By Harold Wager, F.L.S., on 'The Sexuality of the Agaricineæ.'

An Oxy-hydrogen Lantern will be provided for the illustration of the papers, and for showing any slides relating to fungi that may be sent.

Mr. A. Clarke will exhibit a number of stereoscopic photographs of fungi.

The Fungi collected will be on view, and several Microscopes will be available.

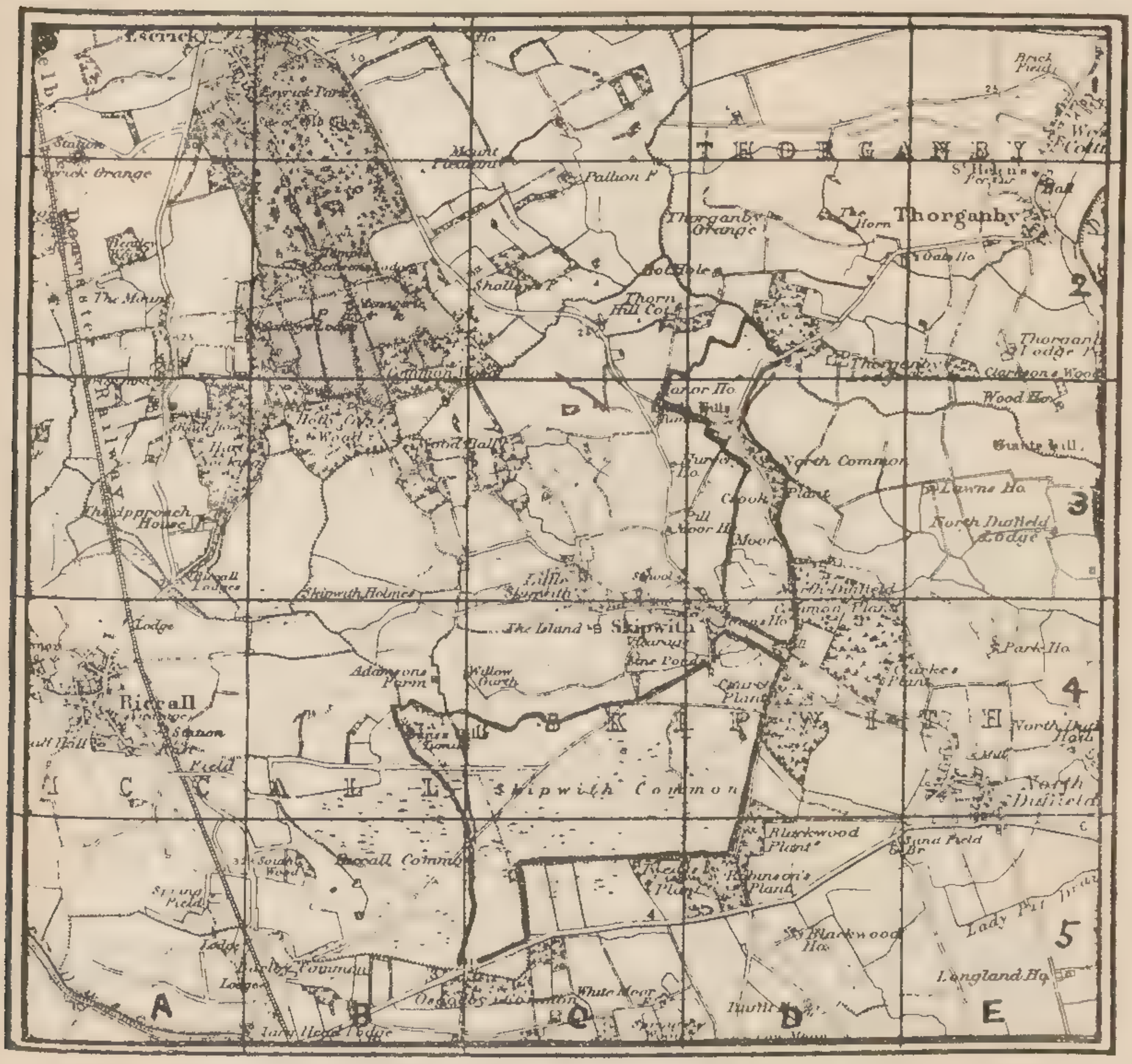
TUESDAY'S ROUTES.—Camblesforth and Carlton Woods, about 6 miles south of Selby, will be investigated. Conveyances will leave the Londesborough Arms, Selby, at 9-30 a.m.

FUNGUS SHOW.—All parties will meet each day after the ramble at the Londesborough Arms Hotel, Selby, to examine the specimens collected. The specimens will be arranged and on exhibition on Monday and Tuesday Evenings.

CONSIGNMENTS OF FUNGI from other parts of Yorkshire, or from Lincolnshire, will be gladly received : they should be labelled with locality and Collector's name, packed in moss or grass (not paper) and addressed to Mr. Cheesman at the Londesborough Arms, Selby.

A LINCOLNSHIRE DAY will be arranged for Wednesday, 23rd September, if any members or visitors can spare the time to work the woods near Brigg. Any who will, should communicate with Rev. E. Adrian Woodruffe-Peacock, F.L.S., Cadney Vicarage, near Brigg, in time to enable him to make arrangements and obtain leave.

EXPLANATION.—The map is divided into square miles by horizontal and perpendicular lines.



The Map shows only the East Riding portion of the district, the country to be investigated on Monday.

Bishop's Wood lies West of Selby, Stainor Wood is about a mile South, and Camblesforth and Carlton about half-a-dozen miles South of Selby, and are not shown in this map.

ADVERTISEMENT.

The Prospectus of a new work by Mr. Charles Dixon, 'BRITISH SEA BIRDS,' (price 10/6), published by Messrs. Bliss, Sands & Co., London, is enclosed with this Circular to Members.

Yorkshire Naturalists' Union.

DATES OF FUTURE EXCURSIONS.

THE Hon. Secretary would be pleased to ascertain the views of members generally as to what Days of the Week are most suitable for the Union's Excursions, as a guidance to the Executive in making arrangements for the programme of the year.

As it is important that the expression of opinion should be general and include the views of all who are at all likely to attend the meetings which suit their convenience, it is hoped that all members who take an interest in the Excursions should respond to this request. It will, of course, be understood that a member expressing himself in favour of any particular day will be looked upon as likely to attend if that day is adopted.

Please use POST-CARDS, addressed to the Hon. Secretary.

The places which will be recommended for 1897 Excursions are Everingham, Scarborough, Cotherstone (Teesdale), Boston Spa, and Skelmanthorpe.

NEXT YEAR'S ANNUAL MEETING.

The Executive are prepared to receive invitations from such towns as are wishful to have the Annual Meeting of next year (1897). Recent Annual Meetings have been held in the West Riding, so that invitations from the North or East Ridings would be particularly appropriate now.

UNPAID SUBSCRIPTIONS.

The Hon. Treasurer would remind members whose subscriptions are still unpaid that, as his accounts are to be shortly balanced for audit, he would take it as a particular favour if outstanding subscriptions were at once paid in, either to himself or to one of the Hon. Local Treasurers.

THIS YEAR'S ANNUAL MEETING

Will be held at LEEDS, *Thursday*, *November 26th*. The Leeds societies will on this occasion have a series of Exhibits in the Art Gallery to illustrate the work done by the Union and all its Sections, Committees, and members during the season of 1896; and they hope to rely on all workers to support them in making a successful display.

Communications should be addressed to Mr. J. W. Addyman, B.A., 15, East Parade, Leeds, who is acting temporarily for the Secretary of the Leeds Reception Committee.

ANNUAL REPORT FOR 1891

(NOVEMBER 1891),

AND

LIST OF MEMBERS,

6th JUNE, 1892.

YORKSHIRE NATURALISTS' UNION.

30th ANNUAL REPORT, for 1891.

In presenting the 30th Annual Report and Statement of Accounts the Executive has to congratulate the members upon a year of steady and continued progress, and valuable work, the publications have been quite up to the average, while the interest evinced in the excursions has been greater than in previous years, and a large amount of work has been achieved by the various Committees appointed for special research.

The Meetings held during the year have been five in number as usual, one for each division of the county.

The districts chosen for investigation and the dates of the meetings were as follows:—

May 18th, Whit-Monday. Leckby Carr.
June 20th, Saturday, Grass Wood.
July 11th, Saturday, Hayburn Wyke.
August 3rd, Bank Holiday Monday, York Dale and Sledmere.
September 16th and 17th, Wednesday and Thursday, Doncaster, for a Fungus Foray in Edlington and Wadworth Woods.

The usual descriptive circular for each excursion was issued to members and associates. A new feature was introduced in the shape of a small map showing the particular tract of country to be investigated, and it is believed that this departure was generally appreciated.

The opening excursion of the year was organised for the investigation of the lower portion of the drainage area of the river Swale. The meeting, which was presided over by Mr. Charles Brownridge, F.G.S., President of the Leeds Geological Association, was held at Brafferton, whence the woods at Baldersby and Leckby Carr and the district around Cundall and Azenby were explored by a large number of members, associates, and friends.

Grassington was selected for the second meeting, when the general body of members confined their attention to Grass Wood, while those Geologically inclined examined the Reef Knolls at Cracoe and Thorpe, under the competent guidance of Mr. R. H. Tiddeman, M.A., F.G.S. Mr. G. T. Porritt, F.L.S., President of the Entomological Section, occupied the chair at the general meeting. One result of this excursion was that several additions were made to the published fauna of the district.

The third meeting was held at Hayburn Wyke for the exploration of that part of the Yorkshire Coast lying between Hayburn Wyke and the Peak, including the Undercliff, Hayburn Beck, Staintondale,

Cloughton Moor, and Wyke. The general meeting was presided over by Mr. C. P. Hobkirk, F.L.S., President of the Botanical Section.

Wetwang-on-the-Wolds was the scene of the August meeting, which was arranged for the examination of York Dale and Sledmere. On this occasion, the Entomologists were successful in verifying an important record made by the Rev. E. Maule Cole, M.A., F.G.S., viz.—the occurrence of the Marbled White Butterfly, a species which had been regarded as extinct in Yorkshire for many years. At the meeting, held under the chairmanship of the Rev. Wm. Fowler, M.A., an ex-president of the Union, a hope was expressed that measures might be taken to protect so interesting and conspicuous an Insect in its last remaining Yorkshire habitat, a hope in which your Executive most earnestly join.

On September 16th, a Fungus Foray took place in the neighbourhood of Doncaster, at which the Union had the benefit of the presence of Mr. George Massee, F.R.M.S., and Prof. C. B. Plowright, F.L.S. The Foray was quite as successful as its predecessors of '81 and '88, and was the means of adding about thirty species of Fungi to the West Yorkshire List.

In connection with this Foray, and on the day following it, the last meeting of the year was held for the exploration of the woods at Edlington and Wadworth. The chair was occupied by the Rev. Wm. Fowler, M.A.

On all the excursions, arrangements had been made to enable photographers to have the use of 'Dark Rooms' in which to change their plates if required. The Hon. Secretaries would have no objection to repeat these arrangements another year if thought advisable, but they would mention that so far as they are aware, the privilege has not on any single occasion been made use of.

As on previous occasions the Yorkshire landowners have again been kind enough to assist in every possible way the work which the Union takes in hand, as have also the Railway Companies whose lines run through the county, the Union being in especial indebted to the North Eastern Railway Company.

The Societies which constitute the Union are now thirty-eight in number, a decrease of one from last year; this is caused by the Keighley Scientific and Literary Society having ceased to exist, and by no new Societies having been admitted during the year.

The Statistics which the Secretaries of the different Societies have again been kind enough to furnish, show a slight diminution in the number of associates, the aggregate membership of the thirty-eight societies now amounting to 2,488, a decrease of 92. Adding to this the number of direct members, the total numerical strength is 2,950.

March 1892.

The Membership now stands at 462, being 23 Life Members, 6 Honorary Life Members, and 433 Ordinary Members, a net increase of 22 upon the previous year. During the year 67 new members have been elected. In this connection, the Union's last annual meeting, held at Halifax, was very largely instrumental in enlisting increased support in that town and neighbourhood, no less than thirty-seven new members, seventeen of them being Life Members, being added on that occasion.

The Union has had to deplore the loss of a few earnest supporters by the decease of John Harrison, of Wilstrop Hall, John Wilson, J.P., of Seacroft, Owen Platt, of Saddleworth, John Spurling, Wakefield, John Trickett, Dacre Banks, and Dr. Wm. Young of Malton.

The Financial Position of the Union is much more satisfactory than in previous years, your Hon. Treasurer having been able by unremitting attention and the valued and efficient aid of the local Hon. Treasurers, to collect a large portion of the arrears of subscriptions which were outstanding twelve months ago. There are now no arrears in several of the collecting districts, and the amount of arrears actually owing is due from a comparatively small number of members.

The Publications of the Union have been as in former years.

The Transactions.—Parts 15 and 16, which are ready, will be sent out together before the end of the present month. This brings the issue of Transactions down to the end of 1890. Part 17, due for 1891, will be devoted to the continuation of Mr. Baker's 'North Yorkshire,' and Part 18, for 1892, will in all probability be occupied by Mr. Robert Kidston's Second Report upon the Yorkshire Carboniferous flora. There would still remain a large amount of MSS. actually in hand, which alone the want of funds prevents your Executive from sending to the printers.

The Library continues to increase by means of donations and exchanges, and it has been found necessary to re-arrange the books in order to economise the limited amount of space available at the Leeds Mechanics' Institution, the directors of which have also placed the Union under considerable obligation by their kindness in allowing the use of their Council Room for the meetings of your Executive. The Union has suffered some inconvenience in consequence of the vacancy caused by Mr. Brownridge's resignation of the office of Librarian last year not having been filled up. Your Executive has now the pleasure of announcing that a successor has been found in Mr. Percy H. Grimshaw.

The Sections of the Union have steadily carried on their work and it is to their systematic organisation that the success of the field excursions is largely due. Their efficiency has been materially

assisted by the adoption of a system of Annual Minute Books, which at the close of each year are to be deposited in the Library, when a new one will be issued. An attempt is being made by the Hon. Secretaries to recover all the Minute Books, Papers, and records of the various sections for previous years, and it is hoped that all past Sectional officers will aid in this endeavour by returning such as may be in their possession.

The Committees of Research have continued their investigations during the year with more or less satisfactory results, and have thoroughly maintained the reputation which the Union enjoys as a distinctively working body.

The Committee for collecting and recording Geological Photographs, of which Mr. James E. Bedford, F.G.S., is the Secretary, has again worked with remarkable success, and from the second report of the British Association Committee it appears that a considerably larger number of Photographs has been sent in from Yorkshire than from any other county. Many of them are of particular value as they refer to Sections which cannot again be photographed, such as fossil trees laid bare in quarrying and excavations for the foundations of buildings, etc.

The Boulder Committee has again been the means of communicating a considerable number of reports on Erratic blocks, and Yorkshire still continues to hold a prominent place in the British Association Committee's report.

The Yorkshire Fossil Flora Committee.—Mr. Robert Kidston is engaged upon a third report of the Yorkshire Carboniferous Flora, which, together with the second report, will duly appear in the Transactions.

The Coast Erosion Committee.—The work of this Committee during the year appears to have been entirely confined to measurements, taken by the Secretary (the Rev. E. Maule Cole, M.A.).

The Disappearance of Plants Committee has only had a moderate amount of assistance during the year, and a limited number of observations have been sent in.

The Committee appointed for the investigation of the Cryptogamic Flora and Invertebrate Fauna of the Freshwaters of Yorkshire, has, through the instrumentality of its Secretary, Mr. J. M. Kirk, F.R.M.S., accomplished a considerable amount of work in the neighbourhood of Doncaster, and hopes to receive support from other districts in the county.

The Marine Zoology Committee has had one opportunity of prosecuting its work in connection with the excursions, and at Hayburn Wyke two members devoted themselves to the investigation

of the Marine Zoology. It is, however, much to be deplored that so few persons take an active interest in this subject, considering the extent and variety of the Yorkshire Coast-line.

British Association.—The Union has again been appointed one of the Corresponding Societies of the Association, and was represented at the Cardiff meeting by the Rev. E. P. Knubley, M.A., whose report is printed in the 'Naturalist,' pages 57-71.

The President and the next Annual Meeting.—It is with great pleasure that your Executive have to announce that the presidency has been offered to and accepted by an old and valued member of the Union, viz. : Mr. Charles P. Hobkirk, F.L.S. The circumstance that the next Annual Meeting will be the 101st meeting of the Union since its reorganisation in 1876, renders it a suitable opportunity in which to review the past history and methods of work, and having regard to the long period during which Mr. Hobkirk has been closely and intimately connected with the Union, as well as to the value of his own scientific work, your Executive feel that no more appropriate selection could have been made.

To Prof. A. H. Green, M.A., F.R.S., the Union wishes to place on record its sense of gratitude for the honour he has conferred upon it by his tenure of office as President, for the year which now comes to a close.

YORKSHIRE NATURALISTS' UNION.

ANNUAL MEETING AT SCARBOROUGH.

THE Annual Meetings of the Union are not so popular as the excursions, for they are almost wholly of a business nature, and, moreover, are held at a proverbially dull season of the year. With regard, however, to the 30th Annual Meeting held at Scarborough on the 14th November last, it was with respect both to the attendance and the interest maintained, an unqualified success. Perhaps no place in the county—or out of it—could have been chosen more attractive to Yorkshire people than Scarborough. The Meeting had been fixed for Saturday, in order that the week-end might be spent at the sea-side. Arrangements had been made by means of which Members and Associates taking tickets on Friday or Saturday, might return on the following Monday or Tuesday. In addition to this the North Eastern Railway Company had, at the instigation of the Union, kindly run an excursion train from West Yorkshire, which enabled persons attending the meeting to return to their homes the same evening if desired. Quite one-third of the number of members attending the excursion took advantage of the arrangements for spending Sunday at this popular watering-place. The weather also was as delightful as could possibly be wished.

The local efforts to make the meeting a success had also been as strenuous as possible. By the kindness of the Scarborough Philosophical Society the Museum was placed entirely at the disposal of the Union, and this Society, together with the Field Naturalists' Club, invited the visitors to a conversazione, at which many valuable and interesting objects were to be shown, the most attractive exhibit undoubtedly being Mr. Alderman Champley's unrivalled series of nine authentic eggs of the Great Auk.

The proceedings commenced at 3 o'clock, when the Sectional Meetings were held in the various rooms of the Museum, after which a Conference of the Committees of Research took place. At 4 o'clock the General Committee met in the Library. Sixteen affiliated Societies were represented, nine of them being by direct delegation and the remaining seven by permanent members of the General Committee. The attendance also included the President (Prof. A. H. Green, F.R.S., F.G.S.), the President-elect (Mr. Charles P. Hobkirk, F.L.S.), two of the Hon. Secretaries (Messrs. Wm. Denison Roebuck, F.L.S., and Edgar R. Waite, F.L.S.), four members of the Executive, three Presidents and five Secretaries of Sections, four local Treasurers, and twelve other permanent members of the General Committee, making a total of forty-three.

The President occupied the Chair. The minutes of the previous Annual Meeting held at Halifax having been taken as read, the 30th Annual Report—printed on pp. 91-95—was read to the Meeting by Mr. Edgar R. Waite, F.L.S., while the Balance Sheet was read by Mr. Wm. Denison Roebuck, F.L.S., and the two taken together were unanimously adopted on the motion of the President, seconded by Mr. C. D. Hardcastle.

The Excursion-programme for 1892 as prepared by the Executive was next read, and on the motion of Messrs. G. T. Porritt, F.L.S., F.E.S., and John Braim, was adopted without discussion as follows:—

York Mid W., Saturday, May 14th, Horton-in-Ribblesdale for Penyghent.
" S.E., Whit Monday, June 6th, Withernsea.
" S.W., Saturday, July 9th, Penistone and Dunford Bridge.
" N.W., Bank Holiday Monday, August 1st, Barnard Castle.
" N.E., Wednesday and Thursday, September 14th and 15th, Fungus Foray and Excursion, Coxwold and Byland.

For the Annual Meeting in 1892, letters of invitation were read from the Skipton, Huddersfield, and Wakefield Societies. An animated discussion followed, when the representatives of Skipton withdrew their claims with a strong recommendation for the following year. The claims of Huddersfield were strongly urged by the delegates from that town (Messrs. A. Clarke, T. W. Woodhead, G. T. Porritt, F.L.S., &c.). Wakefield was unrepresented, Mr. John Gerrard (President) having been prevented at the last moment from attending. Eventually Huddersfield was selected, the date fixed being Tuesday, November the 15th.

The election of officers next engaged the attention of the meeting, when Prof. Green remarked that he would shortly vacate the position of President of the Union in favour of Mr. Charles P. Hobkirk, F.L.S., Chairman of the Executive Council. The reason for modifying the custom of electing the President from outside the working officers of the Union being explained in the concluding paragraph of the Annual Report, page 95.

On the motion of the President, seconded by Mr. M. B. Slater, F.L.S., Messrs. Wm. Denison Roebuck, F.L.S. (Sunny Bank, Leeds), Rev. E. P. Knubley, M.A. (Staveley Rectory), and Edgar R. Waite, F.L.S. (The Museum, Leeds), were re-elected Honorary Secretaries. The proposal of the Executive that Mr. Percy H. Grimshaw should be elected to the vacant office of Librarian was unanimously adopted. The following retiring members of the Executive were re-elected, namely:—Messrs. Jas. W. Davis, F.L.S., F.G.S. (Halifax), Charles P. Hobkirk, F.L.S. (Dewsbury), Jno. Emmet, F.L.S. (Boston Spa), Rev. W. Fowler, M.A. (Liversedge), Benj. Holgate, F.G.S. (Leeds), H. T. Soppitt (Bradford), and J. J. Stead (Heckmondwike). Messrs. G. T. Porritt, F.L.S., F.E.S. (Huddersfield), and John

Gerrard (Wakefield) were elected to fill the vacancies caused by the retirement of Messrs. Wm. Cash, F.L.S. (Halifax), and M. B. Slater, F.L.S. (Malton).

On the motion of the Chairman, seconded by Mr. C. P. Hobkirk, F.L.S., the whole of the Committees of Research were re-appointed with sundry alterations and additions, as follows :—

Yorkshire Boulder Committee :—

Prof. L. C. Miall, F.L.S., F.G.S., Leeds (Chairman).
C. D. Hardcastle, Leeds (Vice-Chairman).
J. E. Bedford, F.G.S., Leeds.
C. Brownridge, F.G.S., Leeds.
W. Lower Carter, M.A., F.G.S., Leeds.
Samuel Chadwick, F.G.S., Malton.
Rev. E. Maule Cole, M.A., F.G.S., Wetwang.
J. W. Davis, F.G.S., F.L.S., Halifax.
Wm. Gregson, Baldersby.
Prof. A. H. Green, M.A., F.R.S., Oxford.
B. Holgate, F.G.S., Leeds.
Wm. Horne, F.G.S., Leyburn.
P. F. Kendall, F.G.S., Stockport.
Robert Law, F.G.S., Halifax.
James Spencer, Halifax.
J. W. Woodall, M.A., F.G.S., Scarborough.
J. R. Mortimer, Driffield.
R. Wood, M.D., Driffield.

Mr. Thos. Tate, F.G.S. (Leeds), was elected Secretary in succession to Mr. Chadwick, who had resigned the office.

Yorkshire Marine Zoology Committee :—

H. C. Sorby, J.P., LL.D., F.R.S., Sheffield (Chairman).
J. Percy A. Davis, Halifax (Hon. Secretary).
G. Brook, F.L.S., Edinburgh.
J. D. Butterell, Beverley.
W. Eagle Clarke, F.L.S., Edinburgh.
John Cordeaux, M.B.O.U., Retford.
W. Cash, F.L.S., Halifax.
Rev. W. C. Hey, M.A., York.
Baker Hudson, Redcar.
T. H. Nelson, Redcar.
O. T. Olsen, F.L.S., Grimsby.
Rev. H. Smith, M.A., Redcar.
J. W. Woodall, M.A., F.G.S., Scarborough.
George Massee, F.R.M.S., Kew, as Botanical Referee.

Yorkshire Fossil Flora Committee :—

Prof. W. C. Williamson, LL.D., F.R.S., Manchester (Chairman).
James W. Davis, F.L.S., F.G.S., F.S.A., Halifax (Vice-Chairman).
William Cash, F.G.S., F.L.S., F.R.M.S., Halifax (Hon. Secretary).
Thos. Hick, B.A., B.Sc., Manchester.
Benj. Holgate, F.G.S., Leeds.
Robert Kidston, F.G.S., F.R.S.E., Stirling.
Robert Law, F.G.S., Halifax.
Prof. L. C. Miall, F.L.S., F.G.S., Leeds.
James Spencer, Halifax.
John Stubbins, F.G.S., F.R.M.S., Leeds.
William West, F.L.S., Bradford.

Yorkshire Coast Erosion Committee :—

J. W. Woodall, M.A., F.G.S., Scarborough (Chairman).
Rev. E. Maule Cole, M.A., F.G.S., Wetwang (Hon. Secretary).
Rev. H. E. Maddock, M.A., Patrington.
J. C. I'Anson, F.S.A., F.G.S., Saltburn-by-the-Sea.
F. Fielder Walton, F.G.S., Hull.

Yorkshire Micro-Zoology and Micro-Botany Committee :—

H. C. Sorby, J.P., LL.D., F.R.S., Sheffield (Chairman).
J. M. Kirk, Doncaster (Hon. Secretary).
C. B. Crawshaw, Dewsbury.
Charles Crossland, Halifax.
Prof. Alfred Denny, F.L.S., Sheffield.
Rev. W. E. Hancock, M.A., Knaresborough.
Chas. P. Hobkirk, F.L.S., Dewsbury.
M. H. Stiles, Doncaster.
William West, F.L.S., Bradford.

Disappearance of Native Plants Committee:—

Charles P. Hobkirk, F.L.S., Dewsbury (Chairman).
P. Fox Lee, Dewsbury (Hon. Secretary).
R. Barnes, Saltburn-by-the-Sea.
Edward Birks, Sheffield.
John Emmet, F.L.S., Boston Spa.
John H. Phillips, Scarborough.
Rev. W. A. Shuffrey, M.A., Arncliffe.
Matthew B. Slater, F.L.S., Malton.
Rev. Wm. Thompson, M.A., Sedbergh.
T. W. Woodhead, Huddersfield.

Geological Photographs Committee:—

James W. Davis, F.L.S., F.G.S., F.S.A., Halifax (Chairman).
James E. Bedford, F.G.S., Headingley, Leeds (Hon. Secretary).
Frederick W. Branson, F.I.C., F.C.S., Leeds.
Godfrey Bingley, Leeds.
Rev. E. Maule Cole, M.A., F.G.S., Wetwang.
Edwin Hawkesworth, Leeds.
George Fowler Jones, Malton.
A. E. Nichols, A.M.Inst.C.E., Leeds.
F. Fielder Walton, F.G.S., Hull.

Protection of Wild Birds' Eggs Committee:—

On the proposal (by letter) of the Rev. E. P. Knubley, M.A., the Union's delegate to the British Association, and supported by members of the Vertebrate Zoology Section, it was resolved to form a new Committee, for the purpose of co-operating with the one appointed at the last meeting of the British Association, to consider proposals for the legislative protection of Wild Birds' Eggs, with instructions to collect evidence as to what birds' eggs should be protected, and how to protect them, and that it consist of the following members:—

Rev. E. P. Knubley, M.A., Staveley (Chairman).
James Backhouse, F.Z.S., Harrogate.
F. Boyes, Beverley.
Thomas Bunker, Goole.
Riley Fortune, F.Z.S., Harrogate.
John Gerrard, Wakefield.
T. H. Nelson, M.B.O.U., Redcar.
Hugh Richardson, M.A., Sedbergh.
J. C. Swailes, Beverley.
Rev. W. T. Travis, M.A., Ripley.
Edgar R. Waite, F.L.S., Leeds.

It was resolved that the Secretaries of the corresponding British Association Committees be Honorary Members of the respective Yorkshire Committees, and that the Honorary Secretaries of the Union be ex officio members of all Committees.

All the retiring Honorary Local Treasurers were re-elected, as follows:—

W. E. Brady, Barnsley.
J. D. Butterell, Beverley.
H. Speight, Bradford.
J. A. Erskine Stuart, Dewsbury.
Geo. Winter, Doncaster.
L. B. Ross, F.C.S., Driffield.
T. Bunker, Goole.
W. Cash, F.L.S., Halifax.
Riley Fortune, F.Z.S., Harrogate.
John Stears, Hull.
Edgar R. Waite, F.L.S., Leeds.
M. B. Slater, F.L.S., Malton.
T. F. Ward, Middlesbrough.
Wm. Fletcher, Pickering.
Thos. H. Nelson, M.B.O.U., Redcar.
Rev. R. A. Summerfield, B.A., Ripon.
Richard Barnes, Saltburn.
J. H. Rowntree, Scarborough.
Hugh Richardson, M.A., Sedbergh.
W. N. Cheesman, Selby.
A. T. Watson, Sheffield.
J. J. Wilkinson, Skipton.
J. J. Stead, Spen Valley.
Wm. Gregson, Thirsk.
Geo. Parkin, Wakefield.
Thos. Newbitt, Whitby.
G. C. Dennis, York.

Mr. A. Clarke was elected to fill the vacancy at Huddersfield.

As the retiring Auditors did not offer themselves for re-election, and as the Executive have no power to make suggestions in this matter, some little difficulty was experienced in obtaining nominations. At length Mr. J. H. Howarth, of Skipton, was elected to act with any two other members whom he might choose to form a Committee of three—of which number any two were empowered to act.

All members of the Union having received voting papers for the election of ten new permanent members of the General Committee, 36 papers had been returned to the scrutineers, who reported the following ten to have received the highest number of votes :—Rev. John Hawell, Ingleby Greenhow, Rev. Wm. Spiers, Hull; J. H. Howarth, Skipton; J. J. Marshall, Market Weighton; J. H. Phillips, Scarborough; Henry Pocklington, F.R.M.S., Leeds; James Rhodes, Keighley; M. L. Thompson, Saltburn; J. W. Sutcliffe, Halifax; and T. W. Woodhead, Huddersfield.

The Darlington Naturalists' Field Club was proposed and seconded in writing, and on the proposition being put to the meeting a member raised the question as to whether a society outside the county should be admitted into the Yorkshire Naturalists' Union. On it being pointed out, however, that although in Durham the members of the club chiefly directed their investigations to the Yorkshire side of the Tees, the Society was unanimously elected into the Union.

It was then unanimously and enthusiastically resolved that the Honorary Membership of the Union be conferred upon Mr. Richard Spruce, Ph.D., F.R.G.S., of Coneysthorpe, near Malton, and Mr. George Robert Vine, of Attercliffe, Sheffield, on the ground of their eminent scientific attainments, as well as of the services which they have rendered to the Union in its work. These propositions were made on behalf of the Council. That in Dr. Spruce's case was introduced by Messrs. Charles P. Hobkirk, F.L.S., and M. B. Slater, F.L.S., and supported by a large number of members. The qualifications on which this proposal was grounded are almost too well known to need repetition; his world-wide reputation as a botanist, and more particularly as regards the mosses and hepatics, in the study of which groups he is recognised as *facile princeps*, his many discoveries and his additions to scientific knowledge during his long sojourn and extensive travels in South America, along the rivers Amazon, Negro, and Orinoco, and among the Andes of Ecuador and Peru, his splendid monograph, entitled 'Hepaticæ Amazonicæ et Andinæ,' and last, but not least, so far as this Union is concerned, the valuable help which he has long given to the Botanical Section, as well as the List of East Riding Hepatics

published in the Transactions, were referred to as making it an honour to Yorkshire naturalists to enrol so distinguished a brother Yorkshireman as one of the Honorary Life Members. In Mr. Vine's case the nomination was made by Prof. A. H. Green, M.A., F.R.S., and Dr. H. Clifton Sorby, F.R.S., who referred to the great value of his long-continued and careful researches in connection with fossil Polyzoa, and reference was also made to the great obligations under which he has laid the Union by his papers upon micro-palæontology, which have been published in 'The Naturalist,' all of which make it an honour to the Union to be able to add such a name to the list. This nomination, like the former one, was also strongly supported by the Executive Council.

The new ordinary members elected were :—

Ellwood Brockbank, Settle.
Jno. G. Chapman, Scarborough.
W. J. Clarke, Scarborough.
F. W. Fierke, Hull.
Ernest Fortune, Harrogate.
D. Hudson, Scarborough.
P. F. Kendall, F.G.S., Stockport.
W. E. Lindley, Skipton.
E. W. Read, B.A., Scarborough.
J. F. Robinson, Hull.
Wm. Rowntree, J.P., Scarborough.
Michael Waller, Hull.
J. J. Wilkinson, Skipton.

The Sectional Officers were next called upon, when they announced the following to have been elected for 1892 :—

B. Vertebrate Zoology.—President, Wm. Eagle Clarke, F.L.S., M.B.O.U., Edinburgh. Secretaries, James Backhouse, F.Z.S., M.B.O.U., Harrogate, and Riley Fortune, F.Z.S., Harrogate (re-elected).

C. Conchology.—President, John W. Taylor, F.L.S., Leeds. Secretaries, F. W. Fierke, Hull, and William Nelson, Leeds.

D. Entomology.—President, Geo. T. Porritt, F.L.S., F.E.S., Huddersfield. Secretaries, J. H. Rowntree, Scarborough, and A. E. Hall, F.E.S., Sheffield, all re-elected.

E. Botany.—President, William West, F.L.S., Bradford. Secretaries, M. B. Slater, F.L.S., Malton (re-elected), and P. F. Lee, Dewsbury.

F. Geology.—President, J. W. Davis, F.G.S., F.L.S., Halifax. Secretaries, W. Lower Carter, M.A., F.G.S., Leeds (re-elected), and F. Fielder Walton, F.G.S., Hull.

A vote of thanks to the retiring President for his services in the chair, passed on the motion of the President-elect and seconded by Mr. Thomas Tate, F.G.S., concluded the business of the meeting.

The members then adjourned to the Grand Hotel, where tea was served.

The Annual Public Meeting was held in the large hall of the Grand Hotel at 7 o'clock, when the chair was occupied by Mr. J. W. Woodall, J.P., M.A., F.G.S. The Annual Report, as

printed in pages 91–95, was taken as read, and after the Excursion-programme for 1892 had been announced to the meeting, the Chairman called upon Prof. A. H. Green, M.A., F.R.S., to deliver the Presidential Address:—"Some Moot Points in Geological Speculation." Afterwards a vote of thanks was accorded to Prof. Green for his presidential services and for his address, on the motion of the Chairman, seconded by Mr. J. H. Phillips.

Votes of thanks were also passed to Mr. Woodall for his services in the chair, and to the Scarborough Philosophical and Naturalists' Societies for their co-operation in the meeting, after which the assembly dispersed to inspect the excellent and interesting exhibition arranged by the Scarborough Societies.

The entertainment took the form of a Conversazione and Exhibition of Local and General Natural History specimens, the most interest-absorbing contribution being the unique series of nine eggs of the Great Auk, the property of Alderman Champley, of Scarborough.

E. R. W.

EXCHANGE LIST.

The Transactions and Circulars of the Y.N.U. are sent regularly to the following Societies and Institutions, in exchange for their respective publications :—

Ashmolean Society, *c/o W. W. Fisher, Chemical Department, the Museum, Oxford.*
Australian Museum, *the Trustees, Sydney, New South Wales.*
Belfast Naturalists' Field Club, *c/o Francis J. Bigger, Rea's Buildings, Belfast.*
Berwickshire Naturalists' Club, *c/o James Hardy, LL.D., Oldcambus, Cockburnspath, Berwickshire.*
Bodleian Library, *c/o G. W. Eccles*, 96, *Great Russell Street, London, E.C.*
Bradford Observer, *Editor of, Bradford.*
Bristol Naturalists' Society, *c/o C. King Rudge*, 145, *Whiteladies Road, Redland, Bristol.*
British Museum Library, *c/o G. Price Tate, Copyright Office, British Museum, London, W.C.*
Burton-on-Trent Nat. Hist. Soc., *c/o James G. Wells, Burton-on-Trent.*
Cambridge University Library, *c/o G. W. Eccles*, 96, *Great Russell St., London, W.C.*
Cardiff Naturalists' Society, *c/o R. W. Atkinson*, 44, *Loudoun Square, Cardiff.*
Chester Society of Natural Science, *c/o G. R. Griffith, Grosvenor Street, Chester.*
Cumberland and Westmorland Association, *c/o J. B. Bailey*, 28, *Eaglesfield Street, Maryport.*
Derbyshire Arch. and Nat. Hist. Society, 33, *Victoria Street, Derby.*
Dublin Trinity College Library, *c/o G. W. Eccles*, 96, *Great Russell St., London, W.C.*
East of Scotland Union of Nat. Hist. Societies, *c/o W. D. Sang, C.E., Kirkcaldy, Fife, N.B.*
Eastbourne Nat. Hist. Soc., *c/o Rev. H. G. Jameson*, 6, *College Road, Eastbourne.*
Eastern Morning News, *Editor of, Hull.*
Edinburgh Advocates' Library, *c/o G. W. Eccles*, 96, *Great Russell St., London, W.C.*
Edinburgh Botanical Society, *Royal Botanic Gardens, Edinburgh.*
Edinburgh, Royal Physical Society of, 40, *Castle Street, Edinburgh.*
Entomological Society, 11, *Chandos Street, Cavendish Square, London.*
Essex Field Club, *c/o A. P. Wire, Buckhurst Hill, Essex.*

Field, *Editor of the*, 346, *Strand, London.*
Glasgow Nat. Hist. Soc., *c/o J. J. F. X. King*, 207, *Bath Street, Glasgow.*
Grevillea, *c/o Dr. M. C. Cooke*, 146, *Junction Road, Holloway, London, N.*
Lancashire and Cheshire Entomological Society, *c/o F. N. Pierce, F.E.S.*, 143, *Smithdown Lane, Liverpool.*
Leeds Mercury, *Editor of, Leeds.*
Leicester Lit. and Phil. Society, *c/o J. M. Gimson*, 100, *New Walk, Leicester.*
Leopold.-Carol. Deutschen Akad. des Naturforschen, *c/o Dr. H. Knoblauch*, 2, *Jägergasse, Halle-am-Saale, Germany.*
Manchester F. Nat. and Arch. Soc., *c/o Alfred Griffiths*, 16, *Kennedy Street, Manchester.*
Manchester Geographical Society, *c/o E. C. Sowerbutts*, 44, *Brown St., Manchester.*
Manchester Geological Society, 36, *George Street, Manchester.*
Manchester Lit. and Phil. Society, 36, *George Street, Manchester.*
Manchester Microscopical Society.
Manchester Museum, *W. E. Hoyle, F.R.S.E., Keeper, Owens College, Manchester.*
Mineralogical Society, *c/o Prof. W. J. Lewis, New Museums, Cambridge.*
Naples Zoological Station (Jahrsberichte of), *c/o Prof. J. Victor Carus*, 30, *Querstrasse, Leipzig.*
Nature, *Editor of*, 29, *Bedford Street, Strand, London, W.C.*
Newcastle-on-Tyne Lit. and Phil. Soc., *c/o H. Richardson, Librarian, Newcastle-on-Tyne.*
Norfolk and Norwich Nat. Soc., *c/o John Quinton, jun., Literary Institute, Norwich.*
Northamptonshire Nat. Hist. Soc., *c/o H. N. Dixon, East Park Parade, Northampton.*
Nova Scotian Institute of Science, *Halifax, Nova Scotia.*
Penzance Nat. Hist. and Antiqn. Society, *Penzance.*
Philadelphia Academy of Nat. Sci., *Race Street, Philadelphia, Pa., U.S.A.*
Plymouth Institution, *the Athenæum, Plymouth.*
Rochdale Lit. and Sci. Soc., *c/o J. R. Ashworth*, 21, *King Street South, Rochdale.*
Royal Dublin Society, *Kildare Street, Dublin.*
Science Gossip, *Editor of*, 214, *Piccadilly, London, W.*
Sheffield and Rotherham Independent, *Editor of, Sheffield.*
Sheffield Daily Telegraph, *Editor of, Sheffield.*
Smithsonian Institution, *Washington, D.C., U.S.A.*
Southport Soc. of Nat. Sci., *c/o G. W. Chaster*, 42, *Talbot Street, Southport.*
Tyneside Nat. F. Club, *c/o R. Howse, the Museum, Newcastle-on-Tyne.*
Warrington Lit. and Phil. Soc., *c/o J. Rymer Young, Museum Lecture Room, Warrington.*
Woolhope Nat. F. Club, *c/o H. C. Moore*, 26, *Broad Street, Hereford.*
York School Nat. Hist. Society, 20, *Bootham, York.*
Yorkshire Archæol. and Topog. Assoc., *c/o J. W. Walker, F.S.A., Boyncliffe, Wakefield.*
Yorkshire Geol. and Polytechnic Society, *c/o J. W. Davis, Chevinedge, Halifax.*
Yorkshire Herald, *Editor of, York.*
Yorkshire Philosophical Society, *the Museum, York.*
Yorkshire Post, *Editor of, Leeds.*
Zoological Record, *Editor of, Zool. Gardens, Regent's Park, London, N.W.*
Zoologist, *Editor of, J. E. Harting, Linnean Society's Rooms, Burlington House, London, W.*

LIST OF MEMBERS AND SOCIETIES.

CORRECTED TO OCTOBER 15th, 1891.

(The Members whose names are printed in heavy type are those of **Permanent Members of the General Committee.** The Dates preceding names are those of election; Original Members, being those elected previous to 1883, are marked —; those to whom **L.** is prefixed are Life Members, by virtue of a donation of not less than five guineas; and those to whom **H.L.** is prefixed are Honorary Life Members.

1888 ... Abram, J. W., *Foston, viâ Hull.*
1887 ... **Ackworth School Natural History Society.**
1889 ... Adams, Lionel E., *B.A., Treas. C.S., Rose Hill, Penistone.*
— ... **Addison,** *Rev.* **Frederick,** *M.A., Sowerby, Thirsk.*
1886 ... Addyman, James W., *B.A. Lond.*, 15 *East Parade, Leeds.*
1889 ... Alexander, R. G., *M.A., M.D., F.L.S., Manor Row Chambers, Bradford.*
1886 ... Anne, *Captain* Edward, *J.P., Hardriding House, Bardon Mill, Carlisle.*
1889 ... Ashwell, Andrew Thomas, *Post-master, Malton.*
1889 ... Atkinson, Thomas, 7, *Normanby Terrace, Whitby.*
1883 ... **Backhouse, James,** *F.Z.S., M.B.O.U., Renoso, Victoria Avenue, Harrogate.*
1890 ... Bacon, J. Cæsar, *Seafield, Santon, Isle of Man.*
— ... **Bairstow, Samuel Denton,** *F.L.S.*, 120, *Main Street, Port Elizabeth, Cape Colony.*
— **H.L.** **Baker, John Gilbert,** *F.R.S., F.L.S., The Royal Herbarium, Kew* (*Ex-President*).
1890 **L.** Balme, E. B. Wheatley, *J.P., Cote Wall, Mirfield, Normanton.*
1890 ... Barber, H. Jocelyn, *Brighouse.*
1888 ... **Barnes, Richard,** *The Gardens, Saltburn-by-the-Sea.*
— ... Barnes-Lawrence, *Rev. Canon* H. F., *M.A., C.M.Z.S., Birkin Rectory, Ferrybridge.*
— ... **Barnsley Naturalists' Society.**
— ... Barran, John, *M.P., Chapel-Allerton Hall, Leeds.*
1889 ... Bayford, E. G., 24, *Cambridge Street, Doncaster.*
— ... Beaumont, Alfred, *F.E.S.*, 153, *Hither Green Lane, Lewisham, London, S.E.*
— ... Bedford, James, *Sycamore Lodge, Woodhouse, Leeds.*
— ... **Bedford, James E.,** *F.G.S.*, 9, *Cardigan Road, Headingley, Leeds.*
1890 ... Bell, James Lumsden, *M.D., White Hall, Driffield.*
1884 ... **Bennett, Samuel H.,** *Boston Grove, Rotherham.*
1883 ... Bethell, William, *J.P., D.L., Rise Park, Hull.*
— ... Bewlay, Frederick, 6, *Vine Street, York.*
1885 ... Bidwell, Edward, *M.B.O.U., Fonnereau House, Twickenham, Middlesex.*
1888 ... Bilbrough, James Wm., *Wharfecote, Ben Rhydding, viâ Leeds.*
1888 ... Bilbrough, Mrs. J. W., *Wharfecote, Ben Rhydding, viâ Leeds.*
1885 ... **Bingley, Godfrey,** *Ash Lea, Cardigan Road, Headingley, Leeds.*
— ... Birchall, Edward, 18, *Moorland Road, Leeds.*
1884 ... **Birks, Edward,** *Birchcliffe, Broomhall Park, Sheffield.*
— ... **Birks, Thomas, jun.,** 25, *High Park Street, Toxteth Park, Liverpool.*
— ... Blakeley, John Wesley, *Ramsden Street, Littletown, Liversedge, viâ Normanton.*
— ... Bothamley, Charles H., *F.I.C., F.C.S., The Yorkshire College, and Hyde Park Villas, Leeds.*
— ... Bould, Charles H., 138, *Halifax Old Road, Huddersfield.*
— ... **Boyes, Frederick,** *Yorkshire Banking Company, Beverley.*
— ... **Bradford Naturalists' and Microscopical Society.**
— ... **Bradford Scientific Association.**
1884 ... **Brady, William E.,** 1, *Queen Street, Barnsley.*
— ... **Braim, John,** *Hungate, Pickering, Yorkshire.*
1885 ... Braithwaite, Wm. D., *Ackworth School, viâ Pontefract.*
1885 ... Branson, Frederick W., *F.I.C., F.C.S.*, 24, *Mount Preston, Leeds.*
— ... Brigg, John, *J.P., F.G.S., Kildwick Hall, viâ Leeds.*

1884 ... **Brittain, Frederick,** *Melbourne Avenue, Sheffield.*
— ... Broadhead, John, *Calverley House, Altofts, Normanton.*
1885 ... Broadhead, Seth, 30, *Shambles Street, Barnsley.*
1887 ... Bromley, John H., *Wortley Lodge, New Wortley, Leeds.*
— ... **Brook, George,** *F.L.S., F.R.M.S., etc., Lecturer on Embryology in the University, Edinburgh.*
— .. **Brooke, Edward, jun.,** *F.G.S., Oakley House, Edgerton, Huddersfield.*
1885 ... Brooke, John Arthur, *J.P., Fenay Hall, Huddersfield.*
1887 ... Brooke, *Ven. Archdeacon* J. Ingham, *M.A., The Vicarage, Halifax.*
1886 ... **Brownridge, Chas.,** *Assoc.M.I.C.E., F.G.S.,* 256, *Burley Mount, Leeds.*
— ... Brunton, George, *Hillary Mount,* 169, *Woodhouse Lane, Leeds.*
1890 ... Buchanan, John Hamilton, *M.D., Sowerby, Thirsk.*
1890 L. Buckton, Joshua, *West Lea, Meanwood, Leeds.*
— ... **Bunker, Thomas,** 9, *East Parade, Goole.*
1891 ... Burton, J. J., *Hambleton House, Nunthorpe, R.S.O., York.*
— ... **Butterell, J. Darker,** *M.C.S.,* 4, *Willow Grove, Westwood, Beverley.*
— ... Butterfield, J. A., *B.Sc.,* 110, *Lewisham Road, London, S.E.*
— ... **Butterfield, E. P. P.,** *Wilsden, near Bingley.*
1890 L. Carlisle, *Right Hon. Earl of, J.P., Castle Howard, York.*
1891 ... Carnell, Thomas, 6, *New Road, Halifax.*
1891 L. Carpenter, Hon. Mrs. [Beatrice], *Kiplin, Northallerton.*
— ... **Carter, James,** *M.B.O.U., Burton House, Masham, vid Bedale.*
— ... **Carter, J. W.,** 25, *Glenholme Road, Whetley Lane, Bradford.*
1890 ... **Carter, W. Lower,** *M.A., F.G.S., Briar Villas, Meanwood, Leeds.*
1887 ... **Cash, William,** *F.L.S., F.G.S., etc., Chairman of Halifax School Board,* 38, *Elmfield Terrace, Halifax.*
1889 ... Chadwick, G. W., 23, *St. Hilda's Terrace, Whitby.*
— ... **Chadwick, Samuel,** *F.G.S., Mount Pleasant, Malton.*
— ... Chaloner, *Rev.* John William, *Vicarage, Newton Kyme, Tadcaster.*
1891 L. Champney, *Col.* John E., *J.P., The Woodlands, Halifax.*
1887 ... Chapman, Abel, *M.B.O.U., Silksworth Hall, Sunderland.*
1890 L. Charlesworth, John B., *J.P., Hatfield Hall, Wakefield.*
1886 ... Chaytor, R. C., *M.C.S., Scrafton Lodge, Middleham, vid Bedale.*
— L. **Cheesman, William Norwood,** *The Crescent, Selby.*
— ... **Clark, James Edmund,** *B.A., B.Sc.,* 20, *Bootham, York.*
— ... **Clarke, Wm. Eagle,** *F.L.S., M.B.O.U., Nat. Hist. Dept., Edinburgh Museum of Science and Art;* 2, *Braidview Terrace, Morningside, Edinburgh.*
1886 ... Clarkson, W. C., *L.R.C.P., etc., Darley, Ripley, vid Leeds.*
1884 ... Clayton, John, *Boxtree House, Thornton Road, Bradford.*
— ... **Clayton West Naturalists' Society.**
1887 ... **Cleveland Naturalists' Field Club.**
— ... Colby, George, *Surgeon, Malton.*
— ... **Cole,** *Rev.* **E. Maule,** *M.A., F.G.S., Vicarage, Wetwang-on-the-Wolds, vid York.*
1884 ... Colley, Francis H., *Sharrow, Sheffield.*
1891 ... Collins, Francis Richard, *Kirkburton Vicarage, Huddersfield.*
— ... **Conacher, John, jun.,** 31, *Spring Wood Street, Huddersfield.*
1891 L. Cooke, James S., *J.P., F.R.A.S., Liversedge, vid Normanton.*
1890 ... Cooper, William, *A.M.Inst.C.E., M.I.M.E., M.I.N.A.,* 18, *Linnæus Street, Hull.*
1886 ... Copley, Walter, *Clough Terrace, Sowerby Bridge.*
1890 ... Corbett, Herbert H., *M.R.C.S.,* 19, *Hall Gate, Doncaster.*
— ... **Cordeaux, John,** *M.B.O.U., Eaton Hall, Retford, Notts.*
1884 ... Cover, John Lee, *Sherburn, vid South Milford.*
1887 ... **Craven Naturalists' Association,** *Skipton.*
1887 ... Crawshaw, C. B., *Bank Terrace, Dewsbury.*
1889 ... Crawshaw, *Rev.* Charles, *Linden House, Shipley.*
1889 ... Crosland, G. W. Kilner, *Holmfield, Fitzwilliam Terrace, Huddersfield.*
1887 ... **Crossland, Charles,** 4, *Coleridge Street, Halifax.*
1884 ... Crossley, William Henry, *Maltby, near Rotherham.*
1884 ... Crossley, Miss Frances Ann, *Maltby, near Rotherham.*
1884 ... Crossley, Miss Mary A. B., *Maltby, near Rotherham.*
1889 ... Dacre, Hubert, 5, *Park Grove, York.*

1884 ... Dale, R. Thornton, 27, *Parish Ghyll Road, Ilkley.*
1885 H.L. **Dallinger,** *Rev.* **W. H.,** *LL.D., F.R.S., F.L.S., Pres. R.M.S., etc., Ingleside, Newstead Road, Lee, London, S.E.* (*Ex-President*).
1883 ... Darbishire, R. D., *B.A., F.S.A., F.G.S., Victoria Park, Manchester.*
1889 ... Davis, J. Percy Avison, *Chevinedge, Halifax.*
— ... **Davis James William,** *F.S.A., F.L.S., F.G.S., Chevinedge, Halifax* (*Mayor of Halifax*).
— ... Davison, George, *Garden House, Keldgate, Beverley.*
1889 ... Davison, Richard, *Driffield.*
1888 ... Dawson, Oswald, *M.C.S., Caledonian House, Leeds.*
1883 ... Dawson, Percival W., 101, *Westbourne Avenue, Hull.*
1891 ... Dawson, R. F., 5, *Noble Street, Great Horton Road, Bradford.*
— ... **Dennis, George C.,** 11, *Tower Street, York.*
1885 ... **Denny, Alfred,** *F.L.S., Professor of Biology in the Firth College;* 1, *Broomgrove Crescent, Sheffield.*
— ... Devonshire, *His Grace the Duke of, K.G., F.R.S., Devonshire House, Piccadilly, London, W.; and Bolton Abbey, Skipton.*
— .. **Dewsbury Naturalists' Society.**
1884 ... **Dickinson, Francis Wm.,** 26, *Bridgegate, Rotherham.*
1890 ... Dickons, J. Norton, 12, *Oak Villas, Manningham, Bradford.*
— ... **Dobrée, N. F.,** *F.E.S., The New Walk, Beverley.*
1891 ... Doncaster, Edwin D., *Green Bank, Sheffield.*
— ... **Doncaster Microscopical and General Scientific Society.**
1889 H.L. **Dresser, Henry Eeles,** *F.L.S., F.Z.S., etc., Topclyffe Grange, Farnborough, R.S.O., Kent* (*Ex-President*).
1889 ... Drury, A., *M.B., C.M., Landon House, Ferguson Street, Halifax.*
1883 ... **Dunning, J. W.,** *M.A., F.L.S., F.E.S.,* 12, *Old Square, Lincoln's Inn, London, W.C.*
— ... **Eddy, J. Ray,** *F.G.S., F.R.M.S., The Grange, Carleton, Skipton.*
1891 ... Edmondson, Joseph, *Heath Avenue, Halifax.*
1889 ... Edson, George, *Bacon's Farm, The Marishes, Pickering.*
— ... **Elland Naturalists' Society.**
1885 ... Ellis, H. M., *Westbourne Villas, Beverley.*
1887 ... Emerson, E. B., *B.A., J.P., Tollesby Hall, Middlesbrough.*
— ... **Emmet, John,** *F.L.S., The Poplars, Boston Spa, R.S.O.*
1887 ... Emmet, Mrs., *The Poplars, Boston Spa, R.S.O.*
1884 ... Eskholme, George, *J.P., Beech-en-Hurst, Rotherham.*
1887 ... Farrah, John, *Crescent Road, Low Harrogate.*
— ... Faulding, Joseph, *Boxley House, Tenterden, Kent.*
1890 .. Fawcett, George, *Keld, Swaledale, viâ Richmond, Yorks.*
— ... Featherstone, I. Garbutt, *Brompton, viâ York.*
1887 ... Fisher, *Rev.* Robert, *M.A., Sewerby Vicarage, viâ Hull.*
1887 ... Fitzgerald, Francis R., *M.C.S.,* 32, *Granville Square, London, W.C.*
1888 ... Fitzwilliam, *Hon.* W. H. Wentworth, *M.P., The Lodge, Malton.*
1889 ... Fletcher, Charles H., 1, *Pavilion Square, Scarborough.*
1889 ... Fletcher, William, *Post Office, Pickering.*
— ... **Foggitt, William,** *South Villa, Thirsk.*
1890 L. Foljambe, Cecil G. Savile, *J.P., Cockglode, Ollerton, Newark.*
1887 ... **Fortune, Riley,** *F.Z.S., Ravensgill, Franklin Mount, Harrogate.*
— ... Foster, Charles, 5, *King's Place, Headingley, Leeds.*
1890 ... Foster, *Rev.* F. Barham, *B.A., Heckmondwike.*
1890 ... Foster, John Machell, *Burgate House, Pickering.*
— ... Foster, Matthew, *Houghton Hall, Sancton, Brough.*
1889 Fountain, Joshua, *Ship Inn, Filey.*
— ... **Fowler,** *Rev.* **William,** *M.A., Vicarage, Liversedge, viâ Normanton* (*Ex-President*).
1884 ... Fox, *Rev.* Henry E., *M.A., M.B.O.U., St. Nicholas' Vicarage,* 12, *South Bailey, Durham.*
1890 ... Frank, George, *Low Hall, Kirby Moorside, viâ York.*
1883 H.L. **Gallwey,** *Sir* **Ralph Payne,** *Bart, M.B.O.U., Thirkleby Park, Thirsk* (*Ex-President*).
— ... Gardiner, H. T., *Times Office, Goole.*
1885 ... Gardner, John, *F.E.S.,* 8, *Friar Terrace, Hartlepool.*
1883 ... **Gaunt, Leonard,** *Prospect House, Farsley, Leeds.*

1886 ... Gaunt, Mrs. L., *Prospect House, Farsley, Leeds.*
1887 **Gerrard, John,** *Government Inspector of Mines, Wakefield.*
1888 Gibb, George S., *LL.B., Chestnut Grove, Heworth, York.*
1891 ... Gledhill, Edward, 15, *New Bond Street, Halifax.*
— ... **Goole Scientific Society.**
1883 ... Gough, *Rev.* T., *B.Sc., F.G.S., King Edward VI. School, East Retford.*
1891 ... Grahl, C. E., *The Limes, Headingley, Leeds.*
— ... **Green, A. H.,** *M.A., F.R.S., F.G.S., etc., Professor of Geology in the University of Oxford,* 137, *Woodstock Road, Oxford* (*President*).
— ... **Gregson, William,** *Baldersby, Thirsk.*
1887 ... **Grimshaw, Percy H.,** 8, *Elm Grove, Burley-in-Wharfedale.*
1888 ... Grimston, Francis Augustus, *Mozergh House, Kendal.*
1884 ... Grove, Edmund, *F.R.M.S., Norlington, Preston, Brighton.*
1887 ... Haigh, G. H. Caton, *Aber-iâ, Penrhyndeudraeth, Merionethshire; and Grainsby Hall, Great Grimsby, Lincolnshire.*
— ... **Halifax Scientific Society and Geological Field Club.**
1889 ... **Hall, A. E.,** *F.E.S., Norbury, Pitsmoor, Sheffield.*
1890 ... Hallimond, Henry T., 3, *Lune Street, Saltburn-by-the-Sea.*
1889 ... Hancock, *Rev.* W. E., *M.A., Vicarage, Knaresborough.*
1887 ... Handley, John, *Briggflatts, Sedbergh, R.S.O.*
1887 ... **Hardcastle, C. D.,** 31, *Victoria Place, Leeds.*
1891 ... Harding, George, F., 4, *Back Crib Lane, Halifax.*
— ... **Harker, Alfred,** *M.A., F.G.S., Woodwardian Museum, and St. John's College, Cambridge; and* 3, *Park Avenue, Princess Avenue, Hull.*
— ... Harrison, John, *Tillage Works, Goole.*
1891 ... Harrison, Joseph H., *Porter Street, Staveley, Chesterfield, Derbyshire.*
1886 ... **Harrogate and District Naturalists' Society.**
1888 ... **Harrogate Ellesmere School Natural History Society.**
1885 ... Harvie-Brown, John A., *F.R.S.E., F.Z.S., M.B.O.U., etc., Dunipace House, Larbert, N.B.*
1890 ... Hawell, *Rev.* John, *M.A., Vicarage, Ingleby Greenhow, Middlesbrough.*
1891 ... Hawkesworth, Edwin, 60, *Bruce Street, New Wortley, Leeds.*
— ... **Heckmondwike Naturalists' Society.**
— ... Herries, *The Right Hon.* M. F. Constable-Maxwell, *Lord, Lord-Lieutenant of the East Riding, Everingham Park, York.*
1891 ... Heslington, T. C., *Ripon.*
— ... **Hewetson, H. Bendelack,** *M.R.C.S., F.L.S., F.Z.S.,* 10, *Hanover Square, Leeds.*
— ... Hewett, William, 6, *Howard Street, Fulford Road, York.*
— ... **Hey,** *Rev.* **Wm. C.,** *M.A., M.C.S., St. Olave's Vicarage, York.*
1883 ... **Hick, Thomas,** *B.A., B.Sc., Owens College; Brighton Grove, Rusholme, Manchester.*
— ... Hindley, A. D., *Liversedge, viâ Normanton.*
1890 L. Hirst, Ben., *J.P., Tamewater, Dobcross, near Oldham.*
— ... Hirst, Joseph, *Sunset Terrace, Birkby, Huddersfield.*
— ... **Hobkirk, Charles C. P.,** *F.L.S., West Riding Union Bank, Dewsbury* (*President-Elect*).
1890 ... Hodgson, Thomas, *Burgate, Pickering.*
— ... Hodgson, William, *Wheelgate, Malton.*
1889 ... Hodsman, George, 8, *Feversham Terrace, York.*
— L. **Holgate, Benj.,** *F.G.S., Regent House, Grosvenor Road, Headingley, Leeds.*
1891 ... Holmes, H. S., *B.Sc., Training College, Carmarthen.*
1891 ... Holtby, Alfred Charles, *Heaton House, Boroughbridge, York.*
1889 ... Holtby, John, *Buck Hotel, Driffield.*
1883 ... Hopkinson, John, *F.L.S., F.G.S., F.R.M.S., etc., The Grange, St. Albans, Herts.*
1884 ... **Horne, William,** *F.G.S., Market Place, Leyburn, viâ Bedale.*
1889 ... **Howarth, Elijah,** *F.R.A.S., Curator of Sheffield Public Museum, Weston Park*; 169, *Northumberland Road, Sheffield.*
1891 ... Howarth, James Henry, *Yorkshire Bank, Skipton.*
1885 ... Huddart, *Rev.* G. A. W., *M.A., LL.D., Kirklington Rectory, Bedale.*
1889 ... **Huddersfield Naturalists' Society.**
1884 ... **Hudleston, Wilfred H.,** *M.A., F.R.S., F.L.S., F.G.S., F.C.S., etc.,* 8, *Stanhope Gardens, London, S.W.* (*Ex-President*).

— ... **Hull Field Naturalists' and Scientific Society.**
1888 ... **Hull Geological Society.**
1888 ... **Hull Scientific Club.**
1883 ... Hurst, Joseph S., *J.P., Copt Hewick Hall, Ripon.*
1891 ... Hutchinson, Charles H., *Victoria Avenue, Barnsley.*
1891 ... Hutchinson, W. B., *F.R.A.S., A.I.E.E., The Observatory, Liversedge, vid Normanton.*
1891 ... Ianson, G. G., *Northgate, Wakefield.*
1884 ... **I'Anson, Joseph Coventry,** *F.S.A., F.G.S., etc.*, 6, *Britannia Terrace, Saltburn-by-the-Sea.*
— ... Ingleby, James, *Eavestone, near Ripon.*
— ... Ingram, Hobson, 57, *Louis Street, New Leeds, Leeds.*
1885 ... Irvin, *Rev.* Benjamin, *M.A., The Vicarage, Saltburn-by-the-Sea.*
1884 ... Irvine, Charles Stuart, *Lawnswood, Adel, Leeds.*
1890 ... Jackson, Andrew Marvel, *Victoria Chambers, Hull.*
— ... Jackson, George, 2, *Clement Street, York.*
— ... **Jackson, John,** *M.P.S., High Street, Wetherby.*
— ... **Jessop,** *Rev.* **William,** *F.A.S., Woodcliffe, Rawdon, Leeds.*
1889 ... Johnson, Henry, 2, *Queen Street, Barnsley.*
1890 ... Jones, A. Orlando, *M.D., Cardigan Villa, Harrogate.*
1890 ... Jones, George Fowler, *Quarrybank, Malton.*
1889 ... Jones, John E., *Balmoral Place, Halifax.*
1890 L. Jones, R. Heywood, *J.P., Badsworth Hall, Pontefract.*
— ... Jowitt, Mrs. Hannah, *Thornton Grove, Ripley, Leeds.*
1891 ... Jubb, Tom, 26, *Milton Place, Halifax.*
1883 ... Kendall, Richard Wm., 57, *Manchester Road, Denton, Manchester.*
1888 ... **Kidston, Robert,** *F.R.S.E., F.G.S.*, 24, *Victoria Place, Stirling, N.B.*
1889 ... King, John, *Grove Villa, Franklin Road, Harrogate.*
1884 ... **Kirk, J. M.,** *F.R.M.S.*, 1, *Bass Terrace, Doncaster.*
1890 L. Kitson, *Sir* James, *Bart., J.P., Gledhow Hall, Leeds.*
— L. **Knubley,** *Rev.* **E. Ponsonby,** *M.A., M.B.O.U., Staveley Rectory, vid Leeds.*
— ... Ladmore, E. J., *Grosvenor Place*, 149, *Manningham Lane, Bradford.*
1889 ... Lambert, Abraham, 7, *York Terrace, Harrogate.*
1884 .. Lancaster, Wm. J., *Church Street, Barnsley.*
1890 ... Last, Edwin Walter, *Mount Edgerton, Huddersfield.*
1888 ... **Law, Robert,** *F.G.S.*, 11, *Cromwell Terrace, Halifax.*
1891 ... Laycock, Thomas, jun., *Deepdene, Franklin Road, Harrogate.*
1888 ... Leach, R. E., *M.A., F.G.S.*, 23, *Regent Street, Hartlepool.*
1883 ... **Leadman, A. D. H.,** *F.S.A., Boroughbridge, viâ York.*
— ... **Lee, Phineas Fox,** *West Park Villas, Dewsbury.*
— ... **Leeds Conchological Society.**
— ... **Leeds Geological Association.**
— ... **Leeds Naturalists' Club.**
1890 L. Lees, Edward B., *J.P., Thurland Castle, Kirkby Lonsdale.*
1890 ... LeTall, Benjamin Bower, *M.A.Lond.*, 20, *Bootham, York.*
1887 ... **Leyburn Literary and Scientific Society.**
1886 ... Lightfoot, *Rev.* Geo. H., *M.A., The Vicarage, Pickering.*
1890 L. Lilford, *Right Hon. Lord, F.L.S., etc., Lilford Hall, Oundle, Northamptonshire.*
— ... Lister, Thomas, 45, *Norfolk Street, King's Lynn, Norfolk.*
— ... **Liversedge Naturalists' Society.**
1889 ... Lofthouse, J. H., 17, *Holmedale Terrace, Harrogate.*
1889 ... Longster, Thomas Piper, *Mowbray Terrace, Malton.*
— ... Loten, Philip W., *Easington, viâ Hull.*
1889 ... Lucy, Charles T., *York Union Bank, Pickering.*
— ... Lund, Charles, *Ilkley.*
1891 ... Lund, Joseph, 6, *Beulah Arcade, Harrogate.*
1884 .. **Lund, Percy,** 6, *Park Drive, Heaton, Bradford.*
— .. Lupton, Henry, *F.E.S., Lyndhurst, North Grange Road, Headingley.*
1887 ... McGhie, Wm. K., *Castle Hill, Rastrick, Brighouse.*
— ... Mackie, *Rev.* John H., *M.A., Sedbergh School, Sedbergh, R.S.O.*
... **McLandsborough, John,** *F.G.S., F.R.A.S., F.R.Met.S., etc.*, 5, *Lindum Terrace, Manningham, Bradford.*

1891 ... McLean, Kenneth, *Studley Terrace, Harrogate.*
1888 ... Macpherson, Angus, 16, *Teresa Terrace, Coatham, Redcar.*
1891 ... Maddock, *Rev.* Henry E., *M.A., F.G.S., Patrington Rectory, Hull.*
— ... Malt, James, *Folkestone, Kent.*
— ... **Malton Field Naturalists' and Scientific Society.**
1891 ... Mansbridge, William, *Luther Place, Horsforth, Leeds.*
1891 ... Marriott, Arthur S., *Manor Lawn, Dewsbury.*
1884 ... Marsh, Robert, jun., *Rotherham.*
— ... Marshall, John, *F.G.S., Summer Place,* 27, *Broughton Lane, Manchester.*
1890 L. Marshall, Arthur, *Hallsteads, Penrith.*
1890 ... Marshall, J. J., *Market Weighton, R.S.O.*
1889 ... Mason, James Eardley, *S.S.C., The Sycamores, Alford, Lincolnshire.*
— ... Mason, Philip Brooke, *J.P., F.L.S., F.E.S., M.C.S., etc., Horninglow Street, Burton-on-Trent.*
— ... **Massee, George E.,** *F.R.M.S.,* 41, *Gloucester Road, Kew, Surrey.*
— ... Meade, R. H., 1, *Mount Royd, Manningham, Bradford.*
1887 ... Meek, J. M., 2, *Nelson Terrace, Coatham, Redcar.*
1884 ... Metcalfe, John Henry, *Leyburn, viâ Bedale.*
— ... **Miall, Louis C.,** *F.L.S., F.G.S., Professor of Biology in the Yorkshire College*; 5, *Montpellier Terrace, Cliff Road, Leeds.*
1891 ... Middleton, Charles, 14, *Lord Street, Halifax.*
1891 ... Miln, Thomas Erskine, *Greenbank Road, Darlington.*
1884 ... Mitchell, T. Carter, *Topcliffe, near Thirsk.*
1889 ... Mitchelson, Thomas, *The Mount, Pickering.*
— ... **Moiser, Henry R.,** *F.G.S., Heworth Grange, York.*
1887 ... More, Alexander Goodman, *F.R.S.E., F.L.S., M.R.I.A.,* 74, *Leinster Road, Dublin.*
1883 ... Morrison, Walter, *M.P., Malham Tarn House, Bell Busk, viâ Leeds.*
1889 ... Mortimer, J. R., *Corn Merchant, Driffield.*
1890 ... Nassau, W. T. H., 7, *Balmoral Terrace, Anlaby Road, Hull.*
1886 ... Naughton, John, *Ellesmere School, Park View, Harrogate.*
1889 ... Naylor, E., 48, *Market Street, Bradford.*
1887 ... **Nelson, Thomas H.,** *M.B.O.U., Oxley Villa, Coatham, Redcar.*
— ... **Nelson, William,** *M.C.S., Gandy Row, Crossgates, Leeds.*
1885 ... **Newbitt, Thomas,** 17, *Royal Crescent, West Cliff, Whitby.*
1891 ... Newhouse, W. H., 8, *Church Street, Brighouse.*
1890 L. Newton, *Rev. Canon* Horace, *The Vicarage, Driffield.*
1890 ... Nicholls, A. E., *Assoc.M.Inst.C.E.,* 43, *Reginald Terrace, Leeds.*
1890 ... Nicholson, John, *Chapeltown, Pudsey.*
1891 ... Niven, George, *Northgate House, Cleckheaton.*
1891 ... Norman, *Rev.* Wm. Haswell, *M.A.,* 18, *New North Road, Huddersfield.*
— ... Nuttall, William, *Moorside, Eccleshill, Bradford.*
1883 ... Oldfield, George Wm., *M.A., F.E.S.,* 21, *Longridge Road, Earl's Court, London, S.W.*
1888 ... Oldroyd, Charles, *Luddington, Goole.*
1886 ... Oliver, Jesse, *The General Infirmary, Leeds.*
— ... Ormerod, Thomas, 72, *Norroy Road, Putney, London, S.W.*
— ... **Ovenden Naturalists' Society.**
1890 L. Oxley, Henry, *Spenfield, Weetwood, Leeds.*
1888 ... Oxley, *Rev.* W. H., *M.A., Petersham Vicarage, Surrey.*
1888 ... Painter, *Rev.* W. Hunt, *Knypersley Hall, Congleton, Cheshire.*
— ... Pape, Tom, *Helmsley, viâ York.*
— ... **Parkin, George,** *York Street, Wakefield.*
— H.L. **Parsons, Henry Franklin,** *M.D., F.G.S.,* 4, *Park Hill Rise, Croydon, Surrey.*
1883 ... Paterson, A., 25, *Milton Street, Doncaster.*
1883 .. Paver-Crow, Richard, *J.P., Ornhams Hall, Boroughbridge, York.*
1891 L. Pawson, Albert Henry, *Lawns House, Farnley, Leeds.*
1891 ... Pawson, Mrs. Alice Sarah, *Lawns House, Farnley, Leeds.*
— ... Payne, Henry, *M.D., Newhill Hill, West Melton, viâ Rotherham.*
1884 ... Peach, Robert, *North Park Road, Harrogate.*
— ... Pearson, Hugh W., *Castle Howard Road, Malton.*
— ... Pease, H. J. Robinson, *J.P., St. Mary's House, Hengate, Beverley.*
— ... Pease, W., *Elm Cottage, Hook, near Howden.*

1888 .. Peirse, *Sir* Henry Beresford, *Bart., J.P., Bedale Hall, Bedale.*
1889 ... Perkins, Frank, 22, *James Street, Harrogate.*
1890 ... Phillips, John H., 22, *Albemarle Crescent, Scarborough.*
1889 ... Pickard, Isaac, *North Park Road, Harrogate.*
1889 ... Place, James A., *Chemist, Pickering.*
1885 ... **Platnauer, H. M.,** *A.R.S.M., B.Sc., F.G.S., etc., Curator of the York Museum; Low Royd, St. Olave's Road, York.*
— ... Pocklington, C., *F.R.M.S.*, 14, *Bertram Terrace, Manningham, Bradford.*
— ... Pocklington, Henry, *F.R.M.S.*, 41, *Virginia Road, Leeds.*
1889 ... **Pocklington Literary and Philosophical Society.**
— ... Pollard, Harry, 19, *Britannia Terrace, New Wortley, Leeds.*
— L. **Porritt, Geo. T.,** *F.L.S., F.E.S., Greenfield House, Huddersfield.*
— ... Powell, Francis Sharp, *M.P., Horton Old Hall, Bradford.*
1887 ... **Powys,** *Rev.* **H. Annesley,** *M.A., Meanwood Vicarage, Leeds.*
1883 ... Priestman, Frederick, *J.P., Pierremont, Manningham, Bradford.*
1890 ... Procter, John William, *Ashcroft, York.*
1884 ... Prodham, Herbert, *Allerston, near Pickering.*
— ... Proudlock, John, *The Nurseries, Market Weighton, R.S.O.*
1889 ... **Purlwell Wesleyan Field Club, Batley.**
1887 ... Pyman, Walter H. S., *Moss Brow, Whitby.*
1885 ... Radcliffe, *Sir* J. Percival, *Bart., F.R.A.S., Rudding Park, Knaresborough.*
1890 ... Raine, Joseph, *Newbiggin, Richmond, Yorkshire.*
1890 ... **Ravensthorpe Naturalists' Society.**
— ... Rawson, F. G. S., *Thorpe, near Halifax.*
1891 ... Reith, A. W., *M.A., Heath Grammar School, Halifax.*
1887 ... Reynolds, Richard, *F.I.C., F.C.S., Cliff Lodge, Hyde Park, Leeds.*
1890 ... Rhodes, James, 9, *Henry Street. Keighley.*
— ... **Richardson, Hugh,** *B.A., M.C.S., Sedbergh School, Sedbergh, R.S.O.*
1883 ... Richmond, *Right Rev.* J. J. Pulleine, *D.D., Bishop of, Stanhope Rectory, viâ Darlington.*
— ... **Ridgway,, J. Ambrose,** *F.R.A.S., The Foundation School, Beverley.*
— ... Ripon, *The Most Hon.* George Frederick Samuel Robinson, *Marquis of, K.G., F.R.S., etc., Studley Royal, Ripon.*
— ... **Ripon Naturalists' Club and Scientific Association.**
— .. **Roberts, George,** *Lofthouse, near Wakefield.*
1890 ... Roberts, Walter, *St. Sepulchre Gate, Doncaster.*
1887 ... Robinson, William, *Green Bank, Sedbergh, R.S.O.*
— ... **Roebuck, Wm. Denison,** *F.L.S., M.C.S., Sunny Bank, Leeds.*
1891 ... Rosenstock, Rudolph, *B.A.Oxon.*, 92, *Fitzwilliam Street, Huddersfield*; *and 7, Clarendon Place, Brighton.*
— ... **Ross, Lewis Buttle,** *F.C.S., etc., Driffield.*
1883 ... **Rotherham Naturalists' Society.**
1884 ... Roundell, Chas. Savile, *Dorfold Hall, Nantwich, Cheshire.*
1889 ... Rowley, Brooke, 52, *Moorfield Terrace, Savile Park, Halifax.*
— ... Rowley, Walter, *M.Inst.C.E., F.G.S., etc., Alder Hill, Meanwood, Leeds.*
1889 ... Rowntree, Allen, 5, *Beulah Terrace, Scarborough.*
— ... **Rowntree, James Henry,** *Westwood, Scarborough.*
1888 ... St. Paul, *Major* Horace, *J.P., The Willows, Ripon.*
1890 ... St. Quintin, W. H., *J.P., Scampston Hall, Rillington, York.*
1884 ... **Sawdon, Fred. John,** *M.D.*, 32, *Beverley Road, Hull.*
— ... Saynor, Benj., 4, *Kellam Street, Accommodation Road, Leeds.*
1890 ... **Scarborough Field Naturalists' Society.**
1887 ... **Scarborough Philosophical and Archæological Society.**
— ... Scargill, A., *East Parade, Sheffield.*
1889 ... Scharff, R. F., *B.Sc., Ph.D., M.C.S., Curator, Nat. Hist. Museum, Dublin.*
1890 ... Scott, Frederick A., *Sutton, near Hull.*
1888 .. Scrope, Simon Thomas, *J.P., D.L., Danby Hall, Bedale.*
1891 ... Seed, Albert, 8, *Crown Street, Halifax.*
— ... **Sheffield Naturalists' Club.**
— ... Shepherd, C. W., *Brook Street, Ilkley.*
1889 ... Sherwood, Eleazer, *M.D., F.R.Bot.S.Ed., Prospect Hill, Whitby.*
1891 ... Shillito, John, 17, *Cavendish Terrace, Halifax.*
— ... Shuffrey, *Rev.* W. A., *M.A., Halton Gill Vicarage, Arncliffe, viâ Skipton.*
1888 ... Silabon, George, *Waterhouse Lane, Hull.*

— ... Sims, Henry, 13, *All Hallowgate, Ripon.*
— ... **Slater,** *Rev.* **Henry H.,** *M.A., F.Z.S., M.B.O.U., Irchester Vicarage, Wellingborough, Northamptonshire.*
— ... **Slater, Matthew B.,** *F.L.S.*, 1, *West Grove Villas, Newbiggin, Malton.*
1888 ... Smith, Christopher W., *Harome, Nawton, viâ York.*
1883 .. Smith, *Rev.* Hy., *M.A., Middleton-One-Row; and Clarendon House, Redcar.*
1884 ... Somerset, Herbert, *Regent Square, Doncaster.*
— ... **Soppitt, Henry Thomas,** 3, *Rose Mount, Bolton, Bradford.*
— ... **Sorby, Henry Clifton,** *LL.D., F.R.S., F.L.S., F.G.S., F.R.M.S., etc., Broomfield, Sheffield (Ex-President).*
1890 ... Sparks, William, *Nafferton Road, Driffield.*
1885 ... **Speight, Harry,** *Gaythorne View, West Bowling, Bradford.*
— ... **Spencer, James,** 8, *Salisbury Place, Akroydon, Halifax.*
1890 ... Spencer, Thomas, *The Terrace, Richmond, Yorkshire.*
1890 ... Spiers, *Miss* Ada Maria, 221, *Rockingham Street, Sheffield.*
1890 ... Spiers, *Rev.* William, *M.A., F.R.M.S., F.G.S., Beverley Road, Hull.*
1891 ... Stather, John W., 16, *Louis Street, Hull.*
— ... **Stead, John James,** *Albert Cottage, Heckmondwike.*
1886 ... **Stears, John,** 125, *Coltman Street, Hull.*
— ... Steel, R. Elliot, *M.A., Hawthorn House, Baildon, Shipley, Yorkshire.*
1889 . Stevenson, John, *Whitby.*
1889 ... Stewart, John T., 3, *Belle Vue Terrace, Whitby.*
1884 ... **Stiles, M. H.,** 2, *Frenchgate, Doncaster.*
1891 **L.** Stobart, William C., *J.P., Spellow Hill, viâ Leeds.*
— ... Stoks, Edwin, *New York, Rawdon, Leeds.*
1883 ... Stott, Walter Henry, *Southwell House, Hall Gate, Doncaster.*
1889 ... Strickland, Walter W., 3, *Rosemont Villas, Richmond, Surrey.*
1884 ... **Stuart, J. A. Erskine,** *L.R.C.S.Ed., etc., Heckmondwike.*
— .. **Stubbins, John,** *F.G.S., F.R.M.S.*, 38, *Ebberston Terrace, Victoria Road, Hyde Park, Leeds.*
1889 ... Suddaby, W. M., *Crown Hotel, Wheelgate, Malton.*
— .. **Summerfield,** *Rev.* **R. A.,** *B.A., North Stainley Vicarage, near Ripon.*
1890 ... Sutcliffe, J. Williams, 27, *West View, Hopwood Lane, Halifax.*
— ... Swailes, Johnson C., *Toll Gavel, Beverley.*
1887 ... **Tate, Thomas,** *F.G.S.*, 5, *Eldon Mount, Woodhouse Lane, Leeds.*
1889 ... Taylor, J. D., *Springfield, Halifax.*
... **Taylor, John W.,** *F.L.S., M.C.S., etc., Outwood Villa, Horsforth, Leeds.*
1884 ... Taylor, *Rev.* Richard Vickerman, *B.A., Melbecks Vicarage, viâ Richmond, Yorkshire.*
1889 ... Taylor, Thomas, *Paddock House, Whitby.*
— ... Taylor, Vincent, *B.A., Burnside School, Ilkley.*
— ... Taylor, W. W., *M.A.*, 10, *King Street, Oxford.*
— .. **Teasdale, Washington,** *F.R.A.S., F.R.M.S., Headingley, Leeds.*
— ... Terry, James, 29, *Holmes Street, Westgate, Bradford.*
— ... Tetley, Charles F., 47, *Cardigan Road, Headingley, Leeds.*
— ... Tew, Thos. Wm., *J.P., Carleton Grange, Pontefract.*
1891 ... Thackrah, Charles Herbert, 4, *Crown Street, Halifax.*
1886 ... Thirkettle, George, 18, *Claremont Road, Headingley, Leeds.*
1887 ... **Thirsk Natural History Society.**
1890 ... Thomas, W. H., 10, *West Terrace, North Ormesby, Middlesbrough.*
1884 ... Thompson, *Major* Ben. Blaydes, 11, *Franklin Parade, Harrogate.*
1891 ... Thompson, *Miss* Frances Phillips, *Castle Hill House, Settle.*
1890 ... Thompson, M. Lawson, *Diamond Street, Saltburn-by-the-Sea.*
1891 ... Thompson, *Miss* Rachel Ford, *Castle Hill House, Settle.*
1884 ... Thompson, Richard, *Dringcote, York.*
1886 ... Thompson, *Rev.* Wm., *M.A., J.P., Guldrey Lodge, Sedbergh, R.S.O.*
— ... **Thrippleton, John,** *Burley View, Burley, Leeds.*
— ... **Tindall, Edward,** *Knapton Hall, Rillington, York.*
— ... Tindall, George, *High Street, Newmarket, Suffolk.*
1891 ... Toothill, James Arnold, 21, *York Terrace, Akroydon, Halifax.*
1884 ... Travis, *Rev.* William Travis, *M.A., The Rectory, Ripley, viâ Leeds.*
1889 ... Trechmann, Chas. O., *Ph.D., F.G.S.*, 10, *Cliff Terrace, Hartlepool.*
1889 .. Turner, Benjamin, 10, *Pitt Street, Barnsley.*
1891 ... Vaughan, Mrs., *Jubilee Buildings, Doncaster.*

1890 ... Veitch, W. Y., *M.D., Grange Road, Middlesbrough.*
1890 ... Waddington, Robert, *Haslingden, Lancashire.*
1888 ... **Waite, Edgar R.,** *F.L.S., Curator of the Leeds Museum, Headingley, Leeds.*
— ... Waite, William, *Cliffe Cottage, Clayton West, viâ Huddersfield.*
— ... Wake, C. Staniland, *M.A.I., Welton, near Brough.*
1889 ... **Wakefield,** *The Right Rev.* **William Walsham-How,** *D.D., etc., Lord Bishop of, Overthorpe, Thornhill, Dewsbury.*
— ... **Wakefield Naturalists' and Philosophical Society.**
1888 ... Walker, A. W., *York and East Riding Bank, Malton.*
1884 ... Walker, *Councillor* Isaac, 11, *Lindum Terrace, Rotherham.*
1890 ... Walker, John Francis, *M.A., F.G.S., F.L.S., F.C.S., F.I.C., F.Z.S., etc.,* 45, *Bootham, York.*
1887 ... **Walker, Samuel,** 75, *Union Terrace, York.*
— ... **Walsingham,** *The Right Hon.* **Thomas De Grey,** *Lord, M.A., F.R.S., F.L.S., Pres. E.S., etc., Merton Hall, Thetford, Norfolk; and Blubberhouses, Yorkshire* (*Ex-President*).
1884 ... **Walton, F. Fielder,** *M.R.C.S., F.G.S.,* 10, *Charlotte Street, Hull.*
— ... Ward, George, *F.I.C., F.C.S.,* 1, *Buckingham Terrace, Hyde Park, Leeds.*
1884 ... Ward, Seth, *Fairfields, Dewsbury.*
1887 ... **Ward, Thomas F.,** *Park Road South, Middlesbrough.*
1891 ... Waterfall, Charles, *Holly Cottage, Welton, Brough.*
1885 ... **Watson, Arnold Thomas,** *Southwold, Tapton Crescent, Sheffield.*
1887 ... Watson, John William, *Redcar.*
1887 ... Watts, *Rev.* A., *F.G.S., F.R.G.S., The Rectory, Witton Gilbert, Durham.*
1890 ... Waud, Henry, *The Gardens, Brinkburn, Darlington.*
1888 ... Weetman, Henry, *F.Z.S., The Hawthorns, Little Haywood, Stafford.*
— ... **West, William,** *F.L.S.,* 15, *Little Horton Lane, Bradford.*
— ... Wharncliffe, *The Right Hon.* E. M. S. G. Montagu-Stuart-Wortley-Mackenzie, *Earl of, Wortley Hall, near Sheffield.*
1889 ... Wheldon, John Wm., *Burgate, Pickering.*
1890 ... Whitaker, J. A., *Craven Lodge, Halifax.*
1885 ... Whitaker, Joseph, *F.Z.S., M.B.O.U., Rainworth Lodge, Mansfield, Nottinghamshire.*
— ... Whitaker, T. Stephen, *F.R.G.S., Everthorpe, Brough.*
1889 ... Whiteley, Frederick, *Clare Road, Halifax.*
1891 ... Whitley, J. H., *B.A., Greenroyd, Halifax.*
— ... **Whitwell, William,** *M.C.S., Roslin,* 4, *Thurleigh Road, Balham, London, S.W.*
— H.L. **Williamson, William Crawford,** *LL.D., F.R.S., Professor of Biology in the Owens College; Fallowfield, Manchester* (*Ex-President*).
1890 ... Wilson, H. J., *M.P., Osgathorpe Hills, Sheffield.*
— ... **Wilson, J. E.,** 8, *Summerseat Place, Bradford.*
1887 ... Wilson, J. Mitchell, *M.D.,* 51, *Hall Gate, Doncaster.*
— ... **Winter, George,** 13, *Baxtergate, Doncaster.*
— ... Wood, John, *B.A., F.R.A.S., Wharfedale College, Boston Spa, R.S.O.*
1889 ... Wood, Richard, *M.D., Beverley Street, Driffield.*
1888 ... **Woodall,** *Major* **John W.,** *M.A., J.P., F.G.S., etc., St. Nicholas House,* Scarborough.
1883 ... Woodd, Basil Thomas, *J.P., D.L., Conyngham Hall, Knaresborough.*
1890 ... Woodd, C. Hampden B., *B.A., Roslyn, Hampstead, London, N.*
— ... Woodd, Charles H. L., *J.P., F.G.S., Oughtershaw Hall, Buckden, viâ Skipton.*
1891 ... Woodhead, David, *Highfield Terrace, Halifax.*
1890 ... Woodhead, T. W., *Birkby, Huddersfield.*
1891 ... Worsnop, C. H., *Cheapside, Halifax.*
1890 ... Worswick, Richard Arthur, *Surveyor, Saltburn-by-the-Sea.*
1890 L. Wright, C. B. E., *J.P., Bolton Hall, Clitheroe.*
— ... Wright, John, *Terrington, viâ York.*
— ... Yewdall, Edwin, 58, *Wade Lane, Leeds.*
1889 ... **Yeadon Geological Society.**
— ... **York Field Naturalists' and Scientific Society.**

The Secretaries of the Union will be glad to be informed of any changes of address or corrections in the above List.

ADDITIONAL LIST & CHANGES OF ADDRESS.

CORRECTED TO JUNE 6th, 1892.

— ... **Addison,** *Rev.* **Frederick,** *M.A., Sutton Road, Thirsk.*
1892 ... Asquith, William E., 23, *Cardigan Road, Headingley, Leeds.*
1889 ... Bayford, E. G., 158, *Doncaster Road, Barnsley.*
— ... Blakeley, John Wesley, *Huddersfield Road, Liversedge.*
1885 ... Braithwaite, Wm. D., *Park View, Horsforth, Leeds.*
1892 ... Brittain, *Ald.* W. H., *J.P., Storth Oaks, Ranmoor, Sheffield.*
1892 ... Brockbank, Ellwood, *Bond End, Settle.*
1892 ... Chapman, John G., *Chapman's Hotel, Scarborough.*
1887 ... Chapman, Abel, *M.B.O.U.*, 1, *John Street, Sunderland.*
1890 L. Charlesworth, John B., *J.P., Stradsett Hall, Downham Market.*
1892 ... Clarke, A., 1, *Melbourne Place, Aspley, Huddersfield.*
1892 L. Clarke, William James, 44, *Huntriss Row, Scarborough.*
1891 L. Cooke, James S., *J.P., F.R.A.S., Norcott, Liversedge, viâ Normanton.*
1889 ... Crawshaw, *Rev.* Charles, *Wesley Villa, Saltburn-by-the-Sea.*
1892 ... Creaser, William, 40, *East Mount Road, York.*
1892 ... **Darlington Naturalists' Field Club.**
1891 ... Doncaster, Edwin D., *Green Bank, Broomhall Park, Sheffield.*
1883 ... **Dunning, John William,** *M.A., F.L.S., F.E.S.*, 4, *Talbot Square, London, W.*
1890 ... Fawcett, George, *Thwaite, Swaledale, viâ Richmond, Yorkshire.*
1892 ... **Fierke, Frederick Wm.,** *M.C.S.*, 52, *Francis Street West, Hull.*
1892 ... Fortune, Ernest, *Alston House, Harrogate.*
1890 ... Foster, *Rev.* F. Barham, *B.A., the Vicarage, Birkenshaw, viâ Leeds.*
1887 ... **Gerrard, John,** *H.M. Inspector of Mines, Worsley, Manchester.*
1891 ... Grahl, C. E., *Ilkley Wells House, Ilkley.*
— ... **Hey,** *Rev.* **William Croser,** *M.A., M.C.S., Derwent House, West Ayton, Seamer, York.*
1891 ... Heslington, Thos. Clarke, 2, *North Road, Ripon.*
1891 ... **Howarth, James Henry,** *The Crescent, Newton Park, Leeds.*
1892 ... Howse, Richard, *Curator of the Newcastle Museum, and Hon. Sec. Tyneside Nat. Field Club*, 12, *St. Thomas Crescent, Newcastle-on-Tyne.*
1892 ... Hudson, George, *M.D., Westbourne House, Scarborough.*
1892 ... Kendall, Percy F., *F.G.S.*, 16, *Leegate Road, Heaton Moor, Stockport.*
1892 ... **Leeds Co-operative Naturalists' Society.**
1892 ... Lindley, W. E., *Hothfield Terrace, Skipton.*
1891 ... Loosmore, Mrs. J., *Fern Bank, Eastwood, Notts.*
1891 ... Millward, Adam, *Cambridge Crescent, Harrogate.*
1892 ... Morley, Thomas John, *Toll Gavel, Beverley.*
1887 ... **Nelson, Thomas H.,** *M.B.O.U., Sandringham House, Redcar.*
1890 L. Newton, *Rev.* Canon Horace, *The Vicarage, Redditch.*
1888 ... Painter, *Rev.* W. Hunt, *c/o Miss S. L. Painter*, 147, *Ashted Row, Birmingham.*
1892 ... Parke, George Henry, *F.L.S., F.G.S., St. John's, Wakefield.*
— ... **Parkin, George,** 15, *York Street, Wakefield.*
1892 ... Read, E. W., *B.A., F.G.S., Oliver's Mount School, Scarborough.*
1892 ... Robinson, James Frazer, 37, *Caroline Place, Hull.*
1892 ... Rowntree, William, *J.P., Westwood, Scarborough.*
1889 ... Scharff, Robert F., *Ph.D., B.Sc., M.R.I.A., etc., Curator of the Dublin Nat. Hist. Museum*, 22, *Leeson Park, Dublin.*
1892 ... Sheffield Central Public Free Library.
1892 ... Vaughan, Mrs. Emila, *Jubilee Buildings, Doncaster.*
1888 ... **Waite, Edgar R.,** *F.L.S., Curator of the Leeds Museum*, 21, *Ashville Avenue, Headingley, Leeds.*
1887 ... Walker, Samuel, 23, *Portland Street, York.*
1892 ... Waller, Michael, 105, *Westbourne Avenue, Hull.*
1892 ... Whitaker, Joseph, *Craven Lodge, Halifax.*
1892 ... Wilkinson, J. J., *Burnside, Skipton,*
— H.L. **Williamson,** *Em.-Prof.* **W. C.,** *LL.D., F.R.S.*, 43, *Elms Road, Clapham Common, London.*
... **Winter, George,** 14, *Baxtergate, Doncaster.*

PRINTED BY M CORQUODALE & CO. LIMITED, LEEDS.

(1) Proceedings of Annual Meeting at Huddersfield,

15th Nov. 1892. (*Reprinted from 'Naturalist,' Aug.* 1893.)

(2) 32nd Annual Report, for 1893.

(3) 33rd Annual Report & Balance-Sheet, for 1894.

(4) Report of Finance Committee, Oct. 1894.

(5) List of Members, arranged Geographically,
Corrected to October 18th, 1894.

YORKSHIRE NATURALISTS' UNION.

ANNUAL MEETING AT HUDDERSFIELD.

The 31st Annual Meeting of the Yorkshire Naturalists' Union, held at Huddersfield, on the 15th of November, was a most successful and interesting gathering, no pains having been spared by the Huddersfield Naturalists' Society and its members in their endeavours to promote the success of the meeting and the comfort and enjoyment of their fellow-members from other towns. To this end they organised an extensive Exhibition of Natural History and Scientific Objects, in the Town Hall, which was open to members and visitors from 2 o'clock in the afternoon. The occasion being that of the 100th meeting of the Union since its re-organisation under the name it now bears, special attention was given to the illustration of Yorkshire natural history.

In Geology and Palæontology, Messrs. Joseph Field and C. H. Bould had brought together a fine series of Collections of Fossils and Minerals typical of the Geology of the county, including a number of palæolithic and neolithic flint implements. Mr. S. Learoyd, F.G.S., exhibited a beautiful collection of agates and other stones to illustrate 'Silica and Flint in Nature and Art'; and Mr. James Spencer, of Halifax, showed a large series of sections of Coal Plants and other geological slides, chiefly from the Carboniferous formations.

The Botanical exhibits included a collection of rare Yorkshire plants, which Mr. T. W. Woodhead had brought together with the assistance of Mr. P. F. Lee, of Dewsbury, and Mr. Charles Crossland, of Halifax. By the kindness of Mr. H. T. Mennell, of Croydon, he was able to include the original record-specimens of some of the plants which were discovered in Upper Teesdale by Mr. James Backhouse and Mr. G. S. Gibson. A feature of great interest in this department was a series of memorial plants which had been named in honour of Yorkshire botanists, which Mr. Woodhead had been at some pains to bring together—accompanied by brief biographical notes, and by the portraits of the various botanists in whose honour the plants had been named.

There was a large and most interesting series of exhibits in Entomology. Mr. Geo. T. Porritt, F.L.S., showed the matchless series of *Arctia mendica* from Grimescar near Huddersfield, which were described and figured in the Entomological Society's Transactions for 1889; also some fine varieties of *Arctia lubricipeda* from

York, and the very rare olive-banded form of *Bombyx quercus* from Crosland Moor, Huddersfield; fine melanic forms of *Boarmia repandata* from Netherton Wood, Huddersfield, as well as fine Yorkshire series of *Ypsipetes elutata*, *Cidaria russata*, *Hybernia progemmaria*, etc., and an almost complete collection of the British 'Plume' Moths (*Pterophori*). Mr. George Jackson, of York, showed some extraordinary varieties of *Chelonia caja*, *Arctia lubricipeda*, and *Abraxas grossulariata*. Mr. S. L. Mosley, F.E.S., had numerous objects on view, including a selection of drawings of varieties of the species just referred to, a museum collection of British Butterflies, arranged on an entirely new plan and one calculated to be of the greatest scientific service to students, cases showing life-histories of insects in all orders, and his collection of British Galls and Gall Insects, the Yorkshire examples being specially indicated. He also exhibited a complete collection of British Injurious Insects, prepared for the Museum of Economic Entomology at Melbourne; and numerous cases prepared for educational purposes.

In Conchology, Mr. Joseph Whitwham's remarkably extensive collection of British land and freshwater shells, in which the Yorkshire examples were specially marked, made a brave show, his varied and extensive series of *Anodontæ* and *Uniones* being particularly fine.

In Vertebrate Zoology, the united efforts of Messrs. J. W. Freer, S. L. Mosley, F.E.S., J. Wilkinson, W. Middlemost, jun., S. Calvert, W. H. Smith, Walter Dyson, J. H. Wood, and Ridsdale resulted in bringing together a remarkably interesting series of cases of British birds, their nests and eggs, special care being taken to represent them as far as possible by Yorkshire examples.

A large number of microscopes, objects, and accessory apparatus were displayed under the charge of Messrs. W. F. Piggott, H. G. Brierley, J. Clayton, A. Sheard, W. Lefevre, and A. W. Sykes; while Messrs. W. H. Charlesworth, W. F. Piggott, H. G. Brierley, and others contributed stereoscopes and a number of interesting slides relating to the geology of Yorkshire, Old and New Huddersfield, and other subjects.

Demonstrations with the oxy-hydrogen microscope were given by Mr. W. Tunstall.

Mr. A. Clarke, the energetic Secretary of the Huddersfield Naturalists' Society, was in charge of a powerful oxy-hydrogen lime-light lantern, by which he threw upon a screen a large number of lantern slides, including a number of marine animals brought by Dr. H. C. Sorby, F.R.S., as well as a series of portraits of all the Presidents of the Yorkshire Naturalists' Union, and other distinguished Yorkshire naturalists referred to in the Presidential address.

The exhibition remained open throughout the afternoon and evening, and was a source of interest and gratification to large numbers of members and visitors.

The business meetings began at 3 p.m., when the Sections met and elected their officers for 1893.

At 3.30 the General Committee met for the despatch of business. There was a large attendance of members and delegates, and the chair was occupied by Dr. H. C. Sorby, F.R.S., an ex-President.

The annual report was then read by Mr. Edgar R. Waite, F.L.S., one of the Honorary Secretaries. At the outset it referred to the year having been one of the most successful the Union has ever had, but pointed out that ampler funds and a considerably enlarged membership were needed to enable the Union to expedite the publication of MS. in hand. The meetings were then referred to in detail, after which it was mentioned that the number of Societies in the Union remained the same as in the previous year, that the number of members was also unchanged, remaining at 462, and that the total number of members and associates was 2,518, an increase of 30. The financial position of the Union and the various publications it has issued during the year were then treated of. Reference was next made to the Library, the Sections, the Committees of Research, and the British Association. The report concluded with a suitable reference to the services which Mr. Charles P. Hobkirk, F.L.S., the retiring President, had rendered the Union, of which he was one of the oldest members, and mentioned that he was to be succeeded in that office by so distinguished an ornithologist and traveller as Mr. Henry Seebohm, a native of Sheffield. The reports having been discussed and unanimously adopted, the excursion programme for 1893 was agreed upon, as follows:—

May 22nd, Whit Monday—Aysgarth.
June 15th, Thursday—Askern.
July 10th, Monday—Kirkby Moorside.
Aug. 7th, Bank Holiday Monday—Sawley Abbey.
Sep. 6th and 7th, Wednesday and Thursday—Howden (Fungus Foray and Excursion).

It was decided to hold the next Annual Meeting at Skipton, on Tuesday, November 14th, 1893, in response to a cordial invitation from the Craven Naturalists' Association, presented by Messrs. R. H. Tiddeman, M.A., F.G.S., and J. J. Wilkinson.

The election of officers was then proceeded with. The retiring honorary secretaries, honorary librarian, and executive were all re-elected. The Committees of Research were also re-elected, with slight alterations, Messrs. J. W. Stather and F. F. Walton being

added to the Boulder Committee; Mr. Tom Petch, B.A., to the Marine Zoology Committee; and Mr. J. F. Robinson to the Disappearance of Plants Committee. The Hon. Local Treasurers were re-elected with various additions and substitutions. Mr. Edwin Hawkesworth was elected auditor; and Messrs. H. H. Corbett, R. Paver Crow, J.P., John Gardner, F.E.S., George Jackson, Henry Johnson, R. E. Leach, M.A., F.G.S., Rev. H. E. Maddock, M.A., F.G.S., Thomas Mitchelson, W. Y. Veitch, M.D., and Charles Waterfall were added to the list of permanent members of the General Committee.

The following were elected new members of the Union:—Messrs. John Hill, Morley; Edward Peake, M.A., Settle; Tom Petch, B.A., Hedon; E. G. Potter, York; Albert Rothery, Liversedge.

Discussion then took place as to the inadequacy of funds for the publication of the matter which the Union has in hand for publication, and a resolution agreed to on the motion of Mr. J. W. Addyman, B.A. (on behalf of Mr. W. Denison Roebuck, F.L.S.), seconded by Mr. S. Chadwick, F.G.S., in favour of a very large addition to the membership being secured, and requesting the Executive to devise measures to that end.

The question of the desirability of the establishment by Government of Fish Hatcheries was introduced by Mr. E. Howarth, F.R.A.S., on whose motion, seconded by Mr. A. T. Watson, it was unanimously resolved that 'in the opinion of this meeting, the establishment by Government of Marine Laboratories and Fish Hatcheries would be advantageous to the Fisheries of the United Kingdom.

The Sections then by their spokesmen announced the names of the officers they had elected, after which the proceedings terminated.

A substantial tea was partaken of in the Mayor's Reception Rooms, Mr. A. W. Sykes being the caterer.

In the evening the members assembled in the large hall of the Town Hall for the delivery of the Annual Presidential Address.

The chair was occupied by Mr. George T. Porritt, F.L.S., in the absence of Mr. S. Learoyd, F.G.S., who had been announced to preside. The Presidential Address, written by Mr. Charles P. Hobkirk, F.L.S., whose unavoidable absence was a great disappointment to the members, was then read by Mr. Edgar R. Waite, F.L.S., one of the Secretaries. The address dealt with the history and methods of work of the Union, on the occasion of its completing a series of one hundred meetings since its re-organisation. At the conclusion a cordial vote of thanks to the President for his address and to Mr. Waite for reading it, was adopted on the motion of Rev. W. Fowler, M.A., seconded by Mr. Benjamin Holgate, F.G.S. A similar vote of thanks

to the Huddersfield Naturalists' Society for their most hospitable reception of the Union was proposed in a humorous speech by Rev. E. Maule Cole, M.A., F.G.S., seconded by Mr. John Gerrard, and having been enthusiastically received, acknowledged by Mr. T. W. Woodhead, the President of the Huddersfield Society. A vote of thanks to Mr. Porritt for presiding was adopted on the motion of Dr. H. C. Sorby, F.R.S., seconded by Mr. J. W. Robson, Chairman of the Huddersfield School Board, and concluded a series of meetings which for their success and interest have been unsurpassed in the Union's history.—W.D.R.

YORKSHIRE NATURALISTS' UNION.

32nd ANNUAL REPORT, for 1893.

THE year which is just coming to a close is a memorable one in the annals of the Union, by reason of the changes which have taken place in the list of officers chosen a year ago. Of these, one of the Honorary Secretaries (Mr. Edgar R. Waite) has now taken up an appointment in Sydney, and our Honorary Librarian (Mr. P. H. Grimshaw) a similar one in Edinburgh, while, of the members of the Executive, two (Mr. Jno. Gerrard and Mr. Charles Brownridge) have left Yorkshire, and a third has been lost to us by death, making an unprecedented number of vacancies in so small a body. The Union has been greatly indebted to Mr. Edgar R. Waite and Mr. P. H. Grimshaw for their energetic and unstinted labours in its behalf, and their simultaneous removal very seriously weakened, for a time, the effective power of the Union. Fortunately, we have been able to find most suitable successors in Mr. Walter F. Baker and Mr. Leonard Hawkesworth, both of whom have proved themselves worthy successors of the valued members we have lost. The vacancies in the Executive have now been filled up by the election of the Rev. E. P. Knubley, M.A., Mr. Albert H. Pawson, and Mr. Wm. Cash, F.G.S.

The Meetings held during the year have been five in number as usual, one for each division of the county.

The districts chosen for investigation and the dates of the meetings were as follows :—

May 22nd, Whit-Monday, Aysgarth.
June 15th, Thursday, Askern.
July 10th, Monday, Kirkby Moorside.
August 7th, Bank Holiday Monday, Sawley Abbey.
September 6th and **7th,** Wednesday and Thursday, Pocklington, Fungus Foray and Excursion.

The usual descriptive circular for each excursion was issued to members and associates.

The opening excursion of the year was for the investigation of the neighbourhood of Aysgarth and Carperby, Bishopdale and Waldendale, and the lower slopes of Penhill, Mr. J. Gerrard, M.B.O.U., President of the Vertebrate Section, occupying the chair.

The second meeting was held at Askern for the investigation of the neighbourhood of Askern, Campsall, Shirley Pool and Jungle, Ouston, Burghwallis, &c. The Rev. Wm. Fowler, M.A., an ex-President of the Union, occupied the chair at the General Meeting.

Kirkby Moorside was the place selected for the third meeting for the investigation of the neighbourhood of Douthwaite Dale, Sleightholme Dale, and Kirkdale. The President of the Entomological Section, Mr. James H. Rowntree, occupied the chair.

The valley of the Ribble, from Gisburn to Sawley Abbey, and the Lancashire border was the district chosen for investigation at the fourth excursion. The General Meeting was held at Hellifield, and was presided over by Mr. R. H. Tiddeman, M.A., F.G.S., President of the Geological Section.

The Fungus Foray and Excursion was held at Pocklington for the investigation of the neighbourhood of Barmby, Allerthorpe Common, Kildwick Percy, and Warter. It was originally intended to hold this meeting at Howden, but as this latter place was found to be quite unsuitable for a Fungus Foray, it was decided to go to Pocklington instead.

The average attendance at these excursions has been, if anything, rather larger than in previous years, and would have been much greater but for the very small attendance at the meeting held at Sawley Abbey, owing, most probably, to the inaccessibility of the district.

At the Fungus Foray, the Mycologists had the valuable assistance of Mr. Geo. Massee, of the Royal Herbarium, Kew. This excursion lasted for three days, and some very good results were obtained.

The thanks of the Union are again due to the Yorkshire landowners, who have kindly granted every facility to members for the investigation of their estates, and the Union is greatly indebted also to the Railway Companies, who have, as in previous years, been kind enough to assist in every possible way the work of the Union.

The Societies which constitute the Union are now thirty-six in number, a decrease of two from last year; this is caused by the Leyburn Literary and Scientific Society, and the Purlwell Wesleyan Field Club having ceased to exist, and by no new Societies having been admitted during the year.

The Statistics which the Secretaries of the different Societies have again been kind enough to furnish, show a slight diminution in the number of associates, the aggregate membership of the thirty-six societies now amounting to 2,256, a decrease of 62. Adding to this the number of direct members, the total numerical strength is 2,720.

The Membership now stands at 464, being 26 Life Members, 7 Honorary Life Members, and 431 Ordinary Members, an increase of but two upon the previous year.

During the year 32 new members have been elected.

The Union has to deplore the loss of a few earnest supporters by

the decease of Mr. J. W. Davis, of Halifax; Mr. George Brook, formerly of Huddersfield and more lately of Kew; Dr. Eleazar Sherwood, of Whitby; Dr. W. J. Lancaster, of Barnsley; and Mr. G. R. Vine, of Sheffield.

Mr. J. W. Davis had been for many years an active worker, and a valued member of the Executive, and would shortly have been elected a President of the Union if death had not removed him from amongst us.

Mr. Brook was Mr. Roebuck's first colleague as Hon. Secretary, an office which he filled until his removal to Edinburgh.

The financial position of the Union is not by any means so satisfactory as your Executive could desire. And it is very much to be deplored that for want of due thought and consideration so many members should, by non-payment of the subscriptions which they undertook to contribute, so seriously hamper the Union in the discharge of its own liabilities, and it is to be hoped that this hint will serve to stimulate them to lighten the responsibility which rests on the shoulders of the Hon. Treasurers, by a more prompt compliance with their requests for the payment of subscriptions than they are in many cases accustomed to. Your Executive trust, also, that the Associates will show, in a practical manner, their appreciation of the value of the Union's scientific work by becoming members in sufficiently large numbers.

Proposed Increase of Membership.—At the last Annual Meeting it was resolved that an effort should be made to double the membership, to which end invitations are being addressed to the Associates and others to allow their names to be added to the list for 1894. Your Executive trust there will be a large, generous and willing response to this appeal.

The Publications of the Union have been as in former years.

The Transactions.—Part 18, for 1892, occupied by Mr. Robert Kidston's Second Report upon the Yorkshire Carboniferous flora, has been issued during the year, and Part 19 is in active preparation.

The Naturalist has been published monthly during the year under the sole Editorship of Mr. W. Denison Roebuck, F.L.S., Mr. Waite having retired on his leaving England.

The Library continues to increase, by means of exchanges, and books sent by publishers for review in 'The Naturalist.' The borrowings have far exceeded those of any previous year, and the attention of members is directed to the opportunities afforded them of consulting works on all branches of Natural Science.

The Sections of the Union have steadily carried on their work and it is to their systematic organisation that the success of the field

excursions is largely due. Their efficiency has been materially assisted by the adoption of a system of Annual Minute Books, which at the close of each year are to be deposited in the Library, when a new one will be issued.

The Hon. Secretaries will be glad if those members who have in their possession any of the Minute Books, Papers, and records of the various sections for previous years, will kindly return them to the Hon. Secretaries as soon as possible.

The Secretaries of the Vertebrate Section report that the work of the year has been carried out with the customary amount of vigour and success.

The Hon. Secretaries of the Conchological Section report that the investigations of their Section at the excursions of the Union, taken during the year, have been manifestly discouraging, owing to the ground having been so excessively dry that empty shells have only been taken in districts which, ordinarily, are noted for their productiveness of molluscan life.

At the same time, it is gratifying to observe that at each excursion of the Union the local lists have been considerably augmented, and that even under such unfavourable conditions as described, the season has not expired without furnishing some object lessons, which may be of service in years to come.

The Secretaries of the Entomological Section report that, despite certain unfavourable conditions, the work done this year has quite equalled, if not surpassed, that of previous years. Several new additions have been made to the Yorkshire lists, and the other branches of this section have received equal attention. It is gratifying to note that the number of Coleopterists in the County has increased very considerably during the last two or three years, owing in a great measure, we believe, to the publication of Fowler's 'Coleoptera of the British Islands.'. The most noticeable fact in Entomology this year has been the finding of numbers of species in unusual situations, owing doubtless to the extreme drought. The number of dead larvæ that have been found this year, owing to the same cause, augurs rather unfavourably for next year's collections.

For Phanerogamic Botany, the Secretary, Mr. Albert H. Pawson, gives the following report:—The season of 1893 began very early owing to the unusually warm and bright spring, and at the Aysgarth excursion, on May 22nd, we found ourselves among the summer flowers. At Askern, on June 15th, and at Kirkby Moorside, on July 10th, we experienced almost tropical heat. All these excursions were well attended by our botanical members, and we were tolerably successful in examining the flora of these very interesting districts.

Yorkshire is so well watered a county, and its soil is for the most part of such depth and substance, that it has not suffered from the long drought of the last summer like much of the lighter lands further south; and the wild flowers have generally been well grown and have bloomed well. At the two later excursions of the year there was a thinner attendance. Is it that the spots chosen were hardly so favourable for flowering plants, or does botanical ardour decrease as the summer wanes and the flowers grow fewer?

Mr. W. B. Slater, for Cryptogamic Botany, reports that, in consequence of the remarkably dry sunny weather of the past summer, moisture-loving plants have been much dried up, and it has been an unfavourable season for collecting them in good condition.

The best gathering was made at the Aysgarth excursion when 97 Mosses and 8 Hepatics were obtained, including some 20 rare species, some of them being new records for the district.

During the Kirkby Moorside excursion, July 10th, 21 Mosses and 2 Hepatics were gathered, none of them in good condition on account of the dry season and all of general distribution.

During the Pocklington excursion, September 7th, Mr. J. J. Marshall gathered on Allerthorpe Common a fine patch of the rare Hepatic *Fossombronia dumortieri* Lindb., in very fine fruit and in perfect condition.

Mr. Chas. Crossland reports for Mycology that, owing to the remarkably dry summer fungi have been rather scarce objects at most of the meetings. At Askern few except microscopic species were collected. At the excursion to Sawley Abbey there was a little improvement, about 30, principally agarics, but not very rare, were noted. At the Fungus Foray held in the first week in September at Pocklington, between 170 and 180 species were collected. Nothing, however, particularly rare was noted except a specimen of *Clavaria crassa* Britz. The interest for mycology has been well sustained in some districts, especially about Hebden Bridge, from which place many interesting and rare species hitherto unrecorded for Yorkshire and several that are new to Britain have been obtained recently.

The Secretaries of the Geological Section have to report that the work of the year has been of average interest and success. The Aysgarth excursion was a rare treat for the geologists, as in addition to the excellent sections examined of the Lower Carboniferous rocks, the presence of Mr. J. G. Goodchild, F.G.S., as leader, was an exceptional advantage.

The Askern excursion gave opportunity for the exploration of the Magnesian Limestone beds, but the absence of a local guide considerably limited the work that could be done.

Kirkby Moorside afforded an interesting centre for the study of the Yorkshire Oolites. Good collections of fossils were obtained by some of the members.

The fourth excursion was along the valley of the Ribble, from Sawley Abbey to Gisburn, under the leadership of Mr. R. H. Tiddeman, M.A., F.G.S. Some interesting sections of contorted Carboniferous Limestone were seen.

The turn of the Cretaceous beds came at the final excursion to Pocklington, when interesting sections of the junction between the Upper Lias and the Upper Cretaceous beds were seen; the whole of the intermediate beds being absent in this area owing to excessive denudation.

The Committees of Research have continued their investigations during the year with more or less satisfactory results, and have thoroughly maintained the reputation which the Union enjoys as a distinctively working body.

The Committee for collecting and recording Geological Photographs, of which Mr. James E. Bedford, F.G.S., is the Secretary, has worked with its usual success, and a fair number of photographs have been taken. Many of them are of particular value as they refer to Sections which cannot again be photographed, such as fossil trees laid bare in quarrying and excavations for the foundations of buildings, etc.

The Yorkshire Boulder Committee still continues to hold a prominent place in the British Association Committee's report. The Secretary, Mr. Thomas Tate, reports that during this year the investigation of the main valley of the Calder has received special attention and has been prosecuted with vigour. The new Boulder Map of the County on the one-inch scale has been mounted, and the mapping of all recorded Erratics thereon is in progress. The Committee are now giving their attention to the area around Barnsley, upon which they hope to report next year, and they will welcome any local help that is available.

The Yorkshire Fossil Flora Committee.—Part 18 of the Transactions of the Yorkshire Naturalists' Union, which appeared this year, is devoted to the report on the 'Yorkshire Carboniferous Flora,' by Mr. Robert Kidston, F.R.S.E., F.G.S., on behalf of the above Committee.

The Coast Erosion Committee.—The work of this Committee during the year consists principally of measurements, taken by the Secretary (the Rev. E. Maule Cole). Mr. J. Coventry I'Anson also has forwarded a plan showing the position of the foot of the Boulder Clay Cliff for half a mile between Saltburn-by-the-Sea and Marske,

which, when published in 'The Naturalist,' will form a most valuable record for future observers.

The Disappearance of Plants Committee.—Mr. P. F. Lee, the Secretary, reports that no information has been received from any members of the above committee.

The Committee appointed for the investigation of the Cryptogamic Flora and Invertebrate Fauna of the Freshwaters of Yorkshire, has again done good work, more especially at the Askern Excursion, the report of which has appeared in 'The Naturalist.'

The Marine Zoology Committee has had no opportunity of prosecuting its work in connection with the excursions, but a fair amount of private work has been done and it is hoped that, with the assistance of the Scarborough and Hull societies, in addition to private enterprise, the work will be much extended during the coming year. It is, however, much to be deplored that so few persons take an active interest in this subject, considering the extent and variety of the Yorkshire Coast-line.

Wild Birds' Eggs Committee.—No further evidence has been collected since the last report was presented. The efforts of the British Association Committee, for whom this Committee collected evidence, have this year been directed towards promoting a Bill to amend the Wild Birds' Protection Act, 1880, of prohibiting the taking or destroying of the eggs of such wild birds as are in danger of extinction unless their eggs are protected. Though the Bill has been before both Houses of Parliament, it has not yet passed through its final stages.

British Association.—The Union has again been appointed one of the Corresponding Societies of the Association, and was represented at the Nottingham meeting in the unavoidable absence of the Rev. E. P. Knubley, M.A., by Mr. M. B. Slater, F.L.S. A full account will be printed in the 'Naturalist' shortly.

The presidency for the ensuing year has been offered to and accepted by Mr. R. H. Tiddeman, M.A., F.G.S., a member of H.M. Geological Survey. Your executive in making this pleasing announcement feel that in having secured the services of one who has contributed so largely to the knowledge of Yorkshire geology and to the investigation of the cave treasures of the county, they have been the means of adding one more to the long list of distinguished men who have so ably filled the Presidential chair.

Your Executive wish to place on record their sense of gratitude to Mr. Henry Seebohm, F.L.S., F.Z.S., for the honour he has conferred upon the Union by his tenure of office as President for the year which now comes to a close.

YORKSHIRE NATURALISTS' UNION.

33rd ANNUAL REPORT, for 1894.

THE year which is now coming to a close has not been marked by any very striking events, but the work of the Union has been carried on with the usual amount of vigour and success.

The Meetings held during the year have been five in number as usual, one for each division of the county.

The districts chosen for investigation and the dates of the meetings were as follows :—

May 14, Whit Monday : Sedbergh.
June 16, Saturday : Ferrybridge.
July 14, Saturday : Knaresborough.
Aug. 6, Bank Holiday Monday : South Cave.
Sep. 3 and 4, Monday and Tuesday : (Fungus Foray and Excursion), Mulgrave Woods, Whitby.

The usual descriptive circular for each excursion was issued to members and associates.

The opening excursion of the year was held at Sedbergh for the investigation of the neighbourhood of Dowbiggin, Lune Valley, and Uldale, and owing to the great assistance rendered by the local members was in all respects a thorough success. The President of the Union, Mr. R. H. Tiddeman, occupying the chair.

The second excursion was held at Ferrybridge for the investigation of the neighbourhood of Pontefract, Fryston, and Byram Parks. The Rev. W. Fowler, M.A., an ex-President of the Union, occupied the chair.

The third meeting was held at Knaresborough, when the picturesque valley of the Nidd was explored. This was the best attended meeting of the year. The Rev. W. Fowler, M.A., occupied the chair at the general meeting afterwards.

The neighbourhood of Drewton Dale, Weedley Springs, and Wold Dale, was the scene of the fourth meeting. The general meeting afterwards was held at South Cave, the President of the Entomological Section, Mr. J. H. Rowntree, occupying the chair.

The Fungus foray and excursion was held at Whitby, for the investigation of Mulgrave and Arncliffe Woods. At this meeting the Mycologists had the valuable assistance of Mr. Geo. Massee, of Kew, and Mr. Carleton Rea, M.A., B.C.L., of Worcester. This excursion lasted four days, but owing to the weather was not as successful as in some former years. Mr. J. H. Rowntree occupied the chair.

The average attendance at these meetings has been quite up to the standard of former years.

The best thanks of the Union are due to the Yorkshire landowners who have again kindly granted every facility to members for the investigation of their estates.

Special thanks are also due to the railway companies, who have, by the special privileges which they grant to members and associates, done much to contribute to the success of the excursions.

For the Excursions of the coming year 1895, your Executive recommend that Goathland be visited on Saturday, the 11th of May; a joint meeting with the Lincolnshire Naturalists' Union at Finningley on Whit-Monday, the 2nd June; Flamborough on Saturday, the 29th of June; Richmond on Bank Holiday Monday, the 5th of August; and Bolton Abbey for Troller's Gill on the 2nd of September.

As for the Fungus Foray, your Executive have pleasure in acceding to the request of the Mycologists, and recommending that it be held at Huddersfield at a date to be fixed so as to fit in with other Fungus Forays in the country.

The Societies which constitute the Union are now thirty-six in number, the same number as last year.

The Statistics which the Secretaries of the different Societies have again been kind enough to furnish, show a slight increase in the number of associates, the aggregate membership of the thirty-six Societies now amounting to 2,283, an increase of 27. Adding to this the number of direct members, the total numerical strength is 2,727.

The Membership now stands at 444, being 28 Life Members, 7 Honorary Life Members, and 415 Ordinary Members, a decrease of 20 upon the previous year. The decrease is mainly due to a number of members in default with their subscriptions having been struck off the list.

During the year 34 new members have been elected.

The Union has to deplore the loss by death of Dr. R. Spruce, the eminent botanist and traveller, and one of our three honorary life members; and Mr. W. Topley, who was an honorary member of the Coast Erosion Committee.

The Financial position of the Union continues to be a source of anxiety to your Executive. Although the liabilities of the Union are no more than the outstanding subscriptions due from members would liquidate, your Treasurer and the Local Treasurers who so materially aid him in his labours have a considerable amount of labour in endeavouring to collect the subscriptions.

Your Executive trust that the members in arrear will assist the Hon. Treasurers by a prompt discharge of their liabilities.

A Committee was appointed by the last annual meeting to consider the state of the finances, and their report will be presented independently; but your Executive may take this opportunity of stating that they fully concur in that Committee's views and in the recommendations made.

The Publications of the Union have been as in former years. Of the Transactions there has been no part issued during the year, the reason being that the authors of the various works which are in progress have not been prepared to furnish the requisite MSS. Mr. M. B. Slater has in preparation the moss portion of Baker's 'North Yorkshire,' the Rev. W. C. Hey the continuation of his List of Yorkshire Beetles, and it is hoped that one or both will be ready during the coming year.

The 'Naturalist' has been published monthly during the year under the sole editorship of Mr. W. Denison Roebuck, F.L.S., under whose painstaking management it has fully sustained the reputation which it has of late years enjoyed, and is now the recognised medium for natural history publications for the whole of the North of England.

Your Executive and the Editor would take this opportunity of reminding members that the journal is sufficiently catholic in its scope to welcome articles dealing with the life-history of animals and plants as observed in the northern counties, as well as with any biological and general considerations that the local observations give rise to.

The Library continues to increase, by means of exchanges, and books sent by publishers for review in 'The Naturalist.' Our Honorary Librarian, Mr. Leonard Hawkesworth, to whom the Union is much indebted for his services in that capacity, wishes to direct the attention of members to the opportunities afforded them of consulting works on all branches of Natural Science.

The Sections of the Union have steadily carried on their work and it is to their systematic organisation that the success of the field excursions is largely due. Their efficiency has been materially assisted by the adoption of a system of Annual Minute Books, which at the close of each year are to be deposited in the Library, when a new one will be issued.

The Hon. Secretaries will be glad if those members who have in their possession any of the Minute Books, Papers, and records of the various sections for previous years, will kindly return them to the Hon. Secretaries as soon as possible.

The Committee of Research have continued their investigations during the year with more or less satisfactory results.

For the Yorkshire Fossil Flora Committee Mr. W. Cash, F.G.S., its secretary, reports that but little has been done this year; and that but little response has been made to their appeal for local help, a condition of affairs which it is hoped may be remedied next year.

For the Geological Photographs Committee, Mr. J. E. Bedford, its secretary, reports that although no meetings of the Committee have been held, still good work has been done; 107 views altogether of geological subjects have been taken during the year, all by Mr. Godfrey Bingley, the newly-appointed chairman of the Committee. Of these 38 are for Yorkshire, 41 for Devon and Cornwall, 26 for the coast of Antrim, and a few for other districts. It may be added that the Yorkshire Committee has contributed a very large proportion of the whole of the work done in the British Isles.

The Yorkshire Boulder Committee continues to do good and satisfactory work. Prof. Miall retired a year ago from the chairmanship, and he has been ably succeeded by our President (Mr. R. H. Tiddeman). The Secretary (Mr. Thomas Tate), in the report (which has just been printed in 'The Naturalist'), records that special attention has been given to the glacial geology of the hilly country round Barnsley, in which they have had great assistance from Mr. W. Hemingway. They also report that an East Riding Boulder Committee, of which Mr. J. W. Stather is the Secretary, is actively working in conjunction with the Yorkshire Committee.

The Coast Erosion Committee.—The Rev. E. Maule Cole, secretary of this Committee, in his report, shortly to be printed in 'The Naturalist,' deals with the destruction wrought on the Boulder Clay Cliffs of the Yorkshire Coast by the memorable storm of the 18th of November, 1893.

The Committee appointed for the investigation of the Cryptogamic Flora and Invertebrate Fauna of the Freshwaters of Yorkshire, does not appear to have had the opportunity of continuing its investigations, and the excursion-programme for the past year has not offered much scope in this direction. Mr. J. M. Kirk, the hon. secretary, reports that Mr. M. H. Stiles, of Doncaster, and Mr. J. Newton Coombe, of Sheffield, have investigated diatomaceous gatherings at Cusworth, the result of which will shortly appear in 'The Naturalist.'

The Marine Zoology Committee has had no opportunity of prosecuting its work in connection with the excursions, and it is much to be deplored that so few persons take an active interest in this subject, considering the extent and varied character of the

Yorkshire Coast-line. Mr. Butterell, of Beverley, who has undertaken the secretariate of the Committee, has utilised his time at the sea-side in investigating the shore-life, and some bibliographical work has been commenced on behalf of the Committee.

Wild Birds' Eggs Committee.—No further evidence has been collected since the last report was presented. The efforts of the British Association Committee, for whom this Committee collected evidence, have been directed towards promoting a Bill to amend the Wild Birds' Protection Act, 1880, of prohibiting the taking or destroying of the eggs of such wild birds as are in danger of extinction unless their eggs are protected. Though the Bill has been before both Houses of Parliament, it has not yet passed through its final stages.

British Association.—The Union has again been appointed one of the Corresponding Societies of the Association, and was represented at the Oxford meeting, in the unavoidable absence of the Rev. E. P. Knubley, M.A., by Mr. M. B. Slater, F.L.S., who reports that at the conferences special attention was devoted to a discussion on local museums, and the best manner in which they might be made available for scientific and educational purposes.

The Secretariate.—Your Executive regret that they have to announce that Mr. Walter F. Baker finds it necessary to retire from the Secretariate, owing to other demands upon his time—and their regret is the greater in view of the ability which he has shown during his brief tenure of the office in the management of the Union's affairs. It is a pleasure to know that the Union will continue to have Mr. Baker's aid in its work in other capacities, and it is unfortunate that your Executive have no suitable successor in view. It is, however, always difficult to meet with members in whom the various necessary qualifications for such an office are to be found.

The Presidency for the ensuing year has been offered to and accepted by Dr. Robert Braithwaite, in whom we, as Yorkshiremen, feel that we possess the 'facile princeps' of British bryologists, and whose 'British Sphagnaceæ' and 'British Moss-Flora,' now being issued, as well as other papers on British and foreign mosses, will long rank as the standard works for students of that group of plants.

In conclusion, your Executive have to express their sense of the great service that our retiring President has conferred upon the Union, not only by his occupancy of the chair, but also by the sustained interest he has shown in its work.

FINANCIAL STATEMENT, 1894.

Receipts.

	£	s.	d.	£	s.	d.
Levies paid by Societies :—						
1890	0	11	0			
1891	2	16	0			
1892	0	17	0			
1893	13	1	11			
1894	1	14	0			
				18	0	5
Subscriptions paid by Members :						
1884	0	5	0			
1885	0	13	0			
1886	0	5	6			
1887	0	5	6			
1888	1	1	0			
1889	0	14	0			
1890	2	12	0			
1891	5	10	6			
1892	9	6	0			
1893	27	16	6			
1894	68	10	0			
				116	19	0
Sales from Stock of Publications ..				17	1	8
Subscriptions to 'Naturalist'				147	4	0
				£301	5	1

Payments.

	£	s.	d.	£	s.	d.
Balance from 1893				0	10	10
Members' Card and General Expenses				17	4	5
Expenses of Meetings :—						
Sedbergh	7	12	4			
Ferrybridge	7	8	9			
Knaresborough	7	13	5			
South Cave	6	10	4			
Mulgrave	6	15	3			
Annual Meetings	8	19	0			
				44	19	1
Expenses incurred by Hon. Treasurer				7	15	5
Subscription to Footpath Preservation Society				0	10	6
Expenses of Library, Exchanges, Stock Insurance, &c.				24	17	7
Paid on account of Transactions				31	5	0
Paid on account of 'Naturalist'				160	11	5
Balance in Bank				11	10	10
				£301	5	1

Assets.

1894, *Oct.* 18*th*.

Re 'NATURALIST.'

	£	s.	d.	£	s.	d.
Cash Balance shown in Balance Sheet	11	10	10			
Cash in hands of General and Local Treasurers	27	9	0			
Subscriptions owing	31	12	0			
				70	11	10

Re GENERAL ACCOUNT.

Cash in hands of General and Local Treasurers	37	14	0			
Subscriptions owing	69	5	6			
				106	19	6

Re STOCK ACCOUNT.

Cash in hands of General and Local Treasurers	6	3	6			
Account owing	0	15	0			
Book Cases valued at	6	0	0			
Books in Library	75	0	0			
Stock of Transactions	10	0	0			
" 'Flora'	45	0	0			
" 'Naturalist'	30	0	0			
				172	18	6
				£350	9	10

Liabilities.

'*Re* NATURALIST.'

	£	s.	d.	£	s.	d.
Owing to Secretary	1	14	0			
Owing to Printers	112	1	0			
Add for Nov. and Dec. ..	18	0	0			
				131	15	0

Re GENERAL ACCOUNT.

Owing to Secretary	4	8	0			
Owing to Printers .. .	6	2	6			
				10	10	6

Re TRANSACTIONS.

Owing to Secretary	4	6	6			
Owing to Printers	17	15	0			
				22	1	6
Total Liabilities ..				£164	7	0
Nominal Balance in favour of Union ..				186	2	10
				£350	9	10

REPORT OF FINANCE COMMITTEE.

THE Sub-Committee (consisting of Mr. Walter F. Baker, Mr. William Cash, Mr. J. Ray Eddy, Mr. J. H. Howarth, Mr. A. H. Pawson, Mr. W. Denison Roebuck, and Dr. H. C. Sorby) appointed by the General Committee at the last Annual Meeting, have held various meetings during the year, and have given the subject of the Union's finances generally very careful attention. They are glad to find the Union is in a solvent position, and that the subscriptions in arrears, and estimated to be good, are rather more than sufficient to pay the outstanding liabilities, leaving the Library and old stock as a surplus to the good.

While, however, outstanding subscriptions have to be got in, and always amount to a considerable sum, the liabilities demand prompt settlement, and the inability to effect this, coupled with the danger of unduly increasing them, hampers the work of the Union very seriously, and renders it impossible to publish the Transactions regularly, as well as much other valuable matter at the Council's disposal.

An examination of receipts and expenditure for the last nine years shows the following averages :—

RECEIPTS.

£	
13	Paid by Societies.
104	Paid by Members.
6	Sales of Stock, Transactions, etc.
127	Subscriptions to 'Naturalist.'
£250	

Which represents the Union's normal annual income.

EXPENDITURE.

£	
17	Members' Card and general expenses.
46	Cost of 6 Meetings a year.
7	Treasurer's expenses.
23	Library, Exchanges, and back stock.
3	Committees of Research.
32	Transactions.
127	'Naturalist.'
£255	

Which represents the normal annual expenditure; these figures show an annual deficit of about £5.

Your committee consider there is no room for retrenchment in any department, if the Union is to carry on its work properly and systematically, and they think that vigorous efforts should be at once resorted to to increase the income on the present lines, in order that the operations of the Union may be conducted for the future under favourable conditions, and the liabilities promptly discharged as accrued.

Your Committee have further carefully investigated the position of the Union with regard to its Associates.

They find that the revenue from the affiliated Societies has averaged about £13 per annum, while the actual extra cost which they entail in printing, postage, etc., is about £23, involving a net charge upon the funds of £10 per annum.

Apart from this loss, the privileges enjoyed by Associates for a penny per head paid by their local Societies, are so ample as to deter them from becoming direct subscribers to the Union.

While your Committee fully recognise the value of having upwards of 2,200 Associates interested in Natural History spread over the County, and would be most reluctant to see their privileges in any degree curtailed, the foregoing considerations become important factors in dealing with questions of finance.

Your Committee can only hope that Yorkshiremen will recognise the importance to natural science of this large membership, and so support the Union by enrolling themselves as members.

With the object of placing the finances upon a sound working basis, your Committee recommend that a special subscription list be opened, and a sum of at least £150 raised, in order that the accounts owing to printers, etc., may be paid, and the publications in arrear proceeded with.

Your Committee further recommend that a simultaneous effort be made this winter to enlist new subscribing members, and they welcome a suggestion made to them by the Council that letters be addressed to the president of each affiliated society, and further, that a deputation from the Union wait upon each local society at one of its meetings, to lay before its members the strength of the claims which the county Union has upon their sympathy and active support.

LIST OF MEMBERS,

Arranged Geographically,

CORRECTED TO OCTOBER 10th, 1894.

(The Members whose names are printed in heavy type are those of **Permanent Members of the General Committee.** The Dates preceding names are those of election; Original Members, being those elected previous to 1883, are marked —; those to whom **L.** is prefixed are Life Members, by virtue of a donation of not less than five guineas; and those to whom **H.L.** is prefixed are Honorary Life Members, or Ex-Presidents of the Union.)

Members changing their addresses are requested to inform the Secretaries as soon as possible.

BARKSTON ASH DIVISION.

Pop. 48,470.

1892 ... **Baker, Walter Francis,** *F.E.S., Whitkirk, near Leeds.*
— **L.** **Cheesman, William Norwood,** *The Crescent, Selby.*
— ... **Emmet, John,** *F.L.S., The Poplars, Boston Spa, R.S.O.*
1887 ... Emmet, Mrs., *The Poplars, Boston Spa, R.S.O.*
— ... **Jackson, John,** *M.P.S., High Street, Wetherby.*
— ... **Nelson, William,** *M.C.S., Gandy Row, Crossgates, Leeds.*

BARNSLEY DIVISION.

Pop. 78,844.

1889 ... Bayford, E. G., 20, *Eldon Street, Barnsley.*
1884 ... **Brady, William E.,** 1, *Queen Street, Barnsley*
1885 ... Broadhead, Seth, 30, *Shambles Street, Barnsley.*
1891 ... Hutchinson, Charles H., *Victoria Avenue Barnsley.*
1889 ... **Johnson, Henry,** 62, *Huddersfield Road, Barnsley.*
1894 ... Kaye, George W., 58, *Station Road, Barnsley.*
1892 ... Thirkell, Edward Walter, *Oaks Colliery House, Stairfoot, Barnsley.*
1889 ... Turner, Benjamin, 10, *Pitt Street, Barnsley.*

BRADFORD BOROUGH.

Pop. 216,361.

1894 ... Bradford Free Library and Art Museum, *per Butler Wood, Librarian.*
— ... **Carter, J. W.,** 25, *Glenholm Road, Whetley Lane, Bradford.*
1884 ... Clayton, John, *Boxtree House, Thornton Road, Bradford.*
1891 ... Dawson, R. F., 5, *Noble Street, Great Horton Road, Bradford.*
1890 ... Dickons, J. Norton, 12, *Oak Villas, Manningham, Bradford.*
1884 ... **Lund, Percy,** 43, *Athol Road, Bradford.*
— ... **McLandsborough, John,** *F.G.S., F.R.A.S., F.R.Met.S., etc.,* 5, *Lindum Terrace, Manningham, Bradford.*
— ... Meade, R. H., 1, *Mount Royd, Manningham, Bradford.*
1889 ... Naylor, E., 48, *Market Street, Bradford.*
— ... Nuttall, William, *Moorside, Eccleshill, Bradford.*
1883 ... Priestman, Frederick, *J.P., Pierremont, Manningham, Bradford.*
— ... Pocklington, C., *F.R.M.S.,* 14, *Bertram Terrace, Manningham, Bradford.*
— ... Powell, *Sir* Francis Sharp, *Bart., M.P., Horton Old Hall, Bradford.*
— ... **West, William,** *F.L.S.,* 15, *Little Horton Lane, Bradford.*
— ... **Wilson, J. E.,** 5, *Selborne Terrace, Bradford.*

BUCKROSE DIVISION.

Pop. 50,877.

1888 ... Abram, J. W., *Foston, viâ Hull.*
1890 ... Bell, James Lumsden, *M.D., White Hall, Driffield.*
— ... **Cole,** *Rev.* **E. Maule,** *M.A., F.G.S., Vicarage, Wetwang-on-the-Wolds, viâ York.*
1889 ... Davison, Richard, *Driffield.*
1889 ... Fountain, Joshua, *Ship Inn, Filey.*
1887 ... Fisher, *Rev.* Robert, *M.A., Sewerby Vicarage, viâ Hull.*
1889 ... Mortimer, J. R., *Corn Merchant, Driffield.*
— ... **Ross, Lewis Buttle,** *F.C.S., etc., Driffield.*
1890 ... St. Quintin, Wm. Herbert, *J.P., Scampston Hall, Rillington, York.*
1890 ... Sparks, William, *Nafferton Road, Driffield.*
— ... **Tindall, Edward,** *Knapton Hall, Rillington, York.*
1889 ... Wood, Richard, *M.D., Beverley Street, Driffield.*

CLEVELAND DIVISION.

Pop. 55,882.

1888 ... **Barnes, Richard,** *The Gardens, Saltburn-by-the-Sea.*
1891 ... Burton, J. J., *Hambleton House, Nunthorpe, R.S.O., York.*
1889 ... Crawshaw, *Rev.* Charles, *M.C.S., Opal House, Emerald Street, Saltburn-by-the-Sea.*
1887 ... Emerson, E. B., *B.A., J.P., Tollesby Hall, Middlesbrough.*
1890 ... **Hawell,** *Rev.* **John,** *M.A., Vicarage, Ingleby Greenhow, Middlesbrough.*
1890 ... Hallimond, Henry T., 3, *Lune Street, Saltburn-by-the-Sea.*
1884 ... **I'Anson, Joseph Coventry,** *F.S.A., F.G.S., etc.,* 6, *Britannia Terrace, Saltburn-by-the-Sea.*
1885 ... Irvin, *Rev.* Benjamin, *M.A., The Vicarage, Saltburn-by-the-Sea.*
1888 ... Macpherson, Angus, 16, *Teresa Terrace, Coatham, Redcar.*
1887 .. Meek, J.M., 2, *Nelson Terrace, Coatham, Redcar.*
1887 ... **Nelson, Thomas H.,** *M.B.O.U., Sandringham House, Redcar.*
1883 ... Smith, *Rev.* Hy., *M.A., Middleton-One-Row; and Clarendon House, Redcar.*
1890 ... Thomas, W. H., 14, *Teresa Terrace, Coatham, Redcar.*
1890 ... **Thompson, M. Lawson,** *Diamond Street, Saltburn-by-the-Sea.*
1887 .. Watson, John William, *Redcar.*

COLNE VALLEY DIVISION.

Pop. 59,344.

1890 L. Hirst, Ben., *J.P., Tamewater, Doleross, near Oldham.*
— L. **Porritt, George T.,** *F.L.S., F.E.S., Crosland Hall, near Huddersfield.*

DEWSBURY BOROUGH.

Pop. 72,986.

1894 ... Bradley, Thomas A., *The Bottoms, Savile Town, Dewsbury.*
1887 ... Crawshaw, C. B., *J.P., Rufford Lodge, Oxford Road, Dewsbury.*
1894 ... Hey, Harry, *Queen's Mill, Savile Town, Dewsbury.*
1894 ... Hemingway, Wilson, *Amroyd Villas, Dewsbury.*
— ... **Hobkirk, Charles P.,** *F.L.S., Hill House, Park Road, Dewsbury.*
— ... **Lee, Phineas Fox,** *West Park Villas, Dewsbury.*
1891 ... Marriott, Arthur S., *Manor Lawn, Dewsbury.*

DONCASTER DIVISION.

Pop. 73,032.

1890 ... **Corbett, Herbert H.,** *M.R.C.S.,* 19, *Hall Gate, Doncaster.*
1884 ... Crossley, William Henry, *Maltby, near Rotherham.*
1884 ... Crossley, Miss Frances Ann, *Maltby, near Rotherham.*
1884 .. Crossley, Miss Mary A. B., *Maltby, near Rotherham.*
1884 ... **Kirk, J. M.,** *F.R.M.S.,* 1, *Bass Terrace, Doncaster.*
1883 ... Paterson, A., 25, *Milton Street, Doncaster.*

1890 ... Roberts, Walter, *St. Sepulchre Gate, Doncaster.*
1884 ... **Stiles, M. H.,** 2, *Frenchgate, Doncaster.*
1887 ... Wilson, J. Mitchell, *M.D.*, 51, *Hall Gate, Doncaster.*
— ... **Winter, George,** 14, *Baxtergate, Doncaster.*

ELLAND DIVISION.
Pop. 64,632.

1890 ... Barber, H. Jocelyn, *Brighouse.*
— ... Bould, Charles H., *Ash Grove, Elland.*
1894 ... Buckley, Miles M., 3, *Langdale Street, Elland.*

HALIFAX BOROUGH.
Pop. 82,863.

1887 ... Brooke, *Ven. Archdeacon* J. Ingham, *M.A., The Vicarage, Halifax.*
1887 ... **Cash, William,** *F.G.S.*, 26, *Mayfield Terrace, Halifax.*
1887 ... **Crossland, Charles,** 4, *Coleridge Street, Halifax.*
1894 ... Crump, W. B., *B.A.*, 90, *King Cross Street, Halifax.*
1889 ... Davis, J. Percy Avison, *Cherinedge, Halifax.*
1891 ... Edmondson, Joseph, *Heath Avenue, Halifax.*
1891 ... Gledhill, Edward, 15, *New Bond Street, Halifax.*
1893 ... Greenwood, Arnold, *Akeds Road, Halifax.*
1891 ... Harding, George F., 4, *Back Crib Lane, Halifax.*
1894 ... Imbery, John, 16, *Hyde Park Road, Halifax.*
1891 ... Jubb, Tom, 26, *Milton Place, Halifax.*
1888 ... **Law, Robert,** *F.G.S.*, 11, *Cromwell Terrace, Halifax.*
1891 ... Reith, A. W., *M.A., Heath Grammar School, Halifax.*
1891 ... Shillito, John, *J.P.*, 17, *Cavendish Terrace, Halifax.*
1894 ... Simpson, William, *F.G.S., Linden Road, Halifax.*
... Soppitt, Henry Thomas, 25, *Glen Terrace, Clover Hill, Halifax.*
— ... **Spencer, James,** 8, *Salisbury Place, Akroydon, Halifax.*
1890 ... **Sutcliffe, J. Williams,** 27, *West View, Hopwood Lane, Halifax.*
1889 ... Whiteley, Frederick, *Clare Road, Halifax.*
1892 ... Whitaker, Joseph, *Craven Lodge, Halifax.*
1891 ... Whitley, J. H., *B.A., Brantwood, Halifax.*

HALLAMSHIRE DIVISION.
Pop. 73,249.

— ... Wharncliffe, *The Right Hon.* E. M. S. G. Montagu-Stuart-Wortley-Mackenzie, *Earl of, Wortley Hall, near Sheffield.*

HOLDERNESS DIVISION.
Pop. 41,298.

— ... **Boyes, Frederick,** *Yorkshire Banking Company, Beverley.*
— ... **Butterell, J. Darker,** *M.C.S.*, 4, *Willow Grove, Westwood, Beverley.*
— ... Davison, George, *Garden House, Keldgate, Beverley.*
... **Dobrée. N. F.,** *F.E.S., The New Walk, Beverley.*
1885 ... Ellis, H. M., *Westbourne Villas, Beverley.*
1894 ... Haworth-Booth, *Lieut.-Col.* B. B., *J.P., D.L., Hullbank Hall, Hull.*
... Loten, Phillip W., *Easington, viâ Hull.*
1891 ... **Maddock,** *Rev.* **Henry E.,** *M.A., F.G.S., Patrington Rectory, Hull.*
1892 ... Morley, Thomas John, *Toll Gavel, Beverley.*
— ... **Ridgway, J. Ambrose,** *F.R.A.S., The Foundation School, Beverley.*
1890 ... Scott, Frederick A., *Sutton, near Hull.*

HOLMFIRTH DIVISION.
Pop. 65,159.

1894 ... Clayton, John, *Lidgett House, Wharncliffe, Silkstone, Barnsley.*
— ... Waite, William, *Cliffe Cottage, Clayton West, viâ Huddersfield.*

HOWDENSHIRE DIVISION.
Pop. 49,327.

1894 ... Ash, *Rev.* C. D., *M.A., Skipwith Vicarage, Selby.*
— ... Herries, *The Right Hon.* M. F. Constable-Maxwell, *Lord, Lord-Lieutenant of the East Riding, Everingham Park, York.*

1883 ... **Leadman, Alex. D. H.**, *F.S.A., Oak House, Pocklington, York.*
1890 ... **Marshall, J. J.**, *Market Weighton, R.S.O.*
— ... Pease, W., *Elm Cottage, Hook, near Howden.*
— ... Proudlock, John, *The Nurseries, Market Weighton, R.S.O.*
1891 ... **Waterfall, Charles**, *Holly Cottage, Welton, Brough.*
— ... Whitaker, T. Stephen, *F.R.G.S., Everthorpe, Brough.*

Huddersfield Borough.

Pop. 96,495.

— ... **Brooke, Edward, jun.**, *F.G.S., Oakley House, Edgerton, Huddersfield.*
1885 ... Brooke, John Arthur, *J.P., Fenay Hall, Huddersfield.*
1892 ... Clarke, Alfred, 9, *St. Andrew's Road, Huddersfield.*
1894 ... Cockshaw, Edward, 3, *Beaumont Park Road, Huddersfield.*
— ... **Conacher, John, jun.**, 124, *Bradford Road, Huddersfield.*
1889 ... Crosland, C. W. Kilner, *Holmfield, Fitzwilliam Terrace, Huddersfield.*
1893 L. Mills, F. W., *F.R.M.S., Thornleigh, Huddersfield.*
1894 ... Wilkinson, Johnson, *St. George's Square, Huddersfield.*
1890 ... **Woodhead, T. W.**, *Arnold Street, Birkby, Huddersfield.*

Keighley Division.

Pop. 63,272.

— ... Brigg, John, *J.P., F.G.S., Kildwick Hall, viâ Keighley.*
— ... **Butterfield, E. P. P.**, *Wilsden, near Bingley.*

Kingston-upon-Hull Borough.

Pop. 200,044.

1883 ... Dawson, Percival W., 101, *Westbourne Avenue, Hull.*
1894 ... Dennis, Thomas, 21, *Peel Street, Hull.*
1892 ... **Fierke, Frederick Wm.**, *M.C.S.*, 52, *Francis Street West, Hull.*
1890 ... Jackson, Andrew Marvell, *Victoria Chambers, Hull.*
1892 ... Robinson, James Frazer, 37, *Caroline Place, Hull.*
1884 ... **Sawdon, Fred. John**, *M.D.*, 32, *Beverley Road, Hull.*
1888 ... Silabon, George, *Waterhouse Lane, Hull.*
1891 ... **Stather, John W.**, *F.G.S.*, 16, *Louis Street, Hull.*
1886 ... **Stears, John**, 125, *Cottman Street, Hull.*
1884 ... **Walton, F. Fielder**, *M.R.C.S., F.G.S.*, 10, *Charlotte Street, Hull.*
1892 ... Waller, Michael, 105, *Westbourne Avenue, Hull.*

Leeds City.

Pop. 387,505.

1886 ... Addyman, James W., *B.A. Lond.*, 15, *East Parade, Leeds.*
1892 ... Asquith, William E., 23, *Cardigan Road, Headingley, Leeds.*
— ... Barran, John, *M.P., Chapel-Allerton Hall, Leeds.*
— ... Bedford, James, *Sycamore Lodge, Woodhouse, Leeds.*
— ... **Bedford, James E.**, *F.G.S., Arncliffe, Shirvoak Road, Headingley, Leeds.*
1885 ... **Bingley, Godfrey**, *Thornichurst, Shaw Lane, Headingley, Leeds.*
— ... Birchall, Edward, 18, *Moorland Road, Leeds.*
1885 ... Branson, Frederick W., *F.I.C., F.C.S.*
— ... Brunton, George, *Hillary Mount*, 169, *Woodhouse Lane, Leeds.*
1890 L. Buckton, Joshua, *West Lea, Meanwood, Leeds.*
1890 ... **Carter, W. Lower**, *M.A., F.G.S., Briar Villas, Meanwood, Leeds.*
1892 ... Fortune, Ernest, *c/o E. Woodall*, 58, *Wade Lane, Leeds.*
1891 ... Grahl, C. E., *c/o Schunck & Co., Great George Street, Leeds.*
1893 ... Hawkesworth, Leonard, 49, *Fenton Street, Leeds.*
1891 ... Hawkesworth, Edwin, 11, *Nursery Mount, Woodhouse Hill, Hunslet, Leeds.*
— ... **Hewetson, H. Bendelack**, *M.R.C.S., F.L.S., F.Z.S.*, 10, *Hanover Square, Leeds.*
1891 ... **Howarth, James Henry**, *F.G.S., The Crescent, Newton Park, Leeds.*
— L. **Holgate, Benjamin**, *F.G.S., Cardigan Villa, Grove Lane, Headingley, Leeds.*

1890 L. Kitson, *Sir* James, *Bart., J.P., Gledhow Hall, Leeds.*
1892 ... Kendall, Percy F., *F.G.S., Lecturer on Geology at the Yorkshire College; 5, Woodland Terrace, Stainbeck Lane, Leeds.*
1889 ... Lambert, Abraham, 50, *Cowper Street, Leeds.*
-- ... Lupton, Henry, *F.E.S., Lyndhurst, North Grange Road, Headingley.*
1886 ... Oliver, Jesse, *The General Infirmary, Leeds.*
1890 L. Oxley, Henry, *Spenfield, Westwood, Leeds.*
1891 L. **Pawson, Albert Henry,** *Lawns House, Farnley, Leeds.*
1891 L. Pawson, *Mrs.* Alice Sarah, *Lawns House, Farnley, Leeds.*
1894 ... Pawson, John Edward, *Farnley, Leeds.*
1893 ... Parkinson, Stephen, *The 'Yorkshire Post,' Leeds.*
... **Pocklington, Henry,** *F.R.M.S.*, 41, *Virginia Road, Leeds.*
1887 ... **Powys,** *Rev.* **H. Annesley,** *M.A., Meanwood Vicarage, Leeds.*
1887 ... Reynolds, Richard, *F.I.C., F.C.S., Cliff Lodge, Hyde Park, Leeds.*
... Rowley, Walter, *M.Inst.C.E., F.G.S., etc., Alder Hill, Meanwood, Leeds.*
... **Roebuck, Wm. Denison,** *F.L.S., M.C.S., Sunny Bank, Leeds.*
... Stoks, Edwin, 1a, *Victoria Terrace, Belle Vue Road, Leeds.*
— ... **Stubbins, John,** *F.G.S., F.R.M.S., Dyson House, Burley Wood, Leeds.*
1887 ... **Tate, Thomas,** *F.G.S.*, 5, *Eldon Mount, Woodhouse Lane, Leeds.*
... **Teasdale, Washington,** *F.R.A.S., F.R.M.S.*, 255, *Hyde Park Road, Leeds.*
... Tetley, Charles F., *Spring Bank, Headingley, Leeds.*
— ... **Thrippleton, John,** *Burley View, Burley, Leeds.*
1886 ... Thirkettle, George, 18, *Claremont Road, Headingley, Leeds.*
1894 ... Wager, Harold, *F.L.S., Bank View, Chapel-Allerton, Leeds.*
... Ward, George, *F.I.C., F.C.S.*, 1, *Buckingham Terrace, Hyde Park, Leeds.*
— ... Yewdall, Edwin, 58, *Wade Lane, Leeds.*

Middlesbrough Borough.

Pop. 98,982.

1890 ... **Veitch, W. Y.,** *M.D., The Crescent, Middlesbrough.*
1887 ... **Ward, Thomas F.,** *Park Road South, Middlesbrough.*

Morley Division.

Pop. 65,216.

1890 L. Balme, E. B. Wheatley, *J.P., Cote Wall, Mirfield, Normanton.*
1893 ... Hill, John, *Colliery Offices, Morley, Leeds.*

Normanton Division.

Pop. 72,012.

... Broadhead, John, *Calverley House, Altofts, Normanton.*
1894 ... Burton, John, *Farmer, Horbury, Wakefield.*
... **Roberts, George,** *Lofthouse, near Wakefield.*

Osgoldcross Division.

Pop. 66,794.

1894 .. Blasdale, Ralph, *Marshfield, Goole.*
... **Bunker, Thomas,** 9, *East Parade, Goole.*
... Harrison, John, *Tillage Works, Goole.*
1890 L. Jones, R. Heywood, *J.P., Badsworth Hall, Pontefract.*
1893 ... Leatham, Claude, *The Red House, Wentbridge, Pontefract.*

Otley Division.

Pop. 61,746.

1894 ... Angus, Henry, *M.B., C.M., Barnage House, Bingley.*
1888 ... Bilbrough, James Wm., *Wharfecote, Ben Rhydding, viâ Leeds.*
1888 Bilbrough, *Mrs.* J. W., *Wharfecote, Ben Rhydding, viâ Leeds.*
1893 ... Fawkes, *Mrs.* Edith M., *Farnley Hall, Otley.*
— ... **Miall, Louis C.,** *F.R.S., F.L.S., F.G.S., Professor of Biology in the Yorkshire College; Highfield, Ben Rhydding, Leeds.*
1885 ... **Speight, Harry,** *Highfield Villas, Crowtrest Road, Bingley.*
— ... Taylor, Vincent, *B.A., Burnside School, Ilkley.*

PONTEFRACT BOROUGH.

Pop. 16,407.

— ... Tew, Thos. W., *Carleton Grange, Pontefract.*

PUDSEY DIVISION.

Pop. 49,252.

1885 ... Braithwaite, Wm. D., *Park View, Horsforth, Leeds.*
1883 ... **Gaunt, Leonard,** *Prospect House, Farsley, Leeds.*
1886 ... Gaunt, *Mrs.* L., *Prospect House, Farsley, Leeds.*
— ... **Jessop,** *Rev.* **William,** *F.A.S., Woodcliffe, Rawdon, Leeds.*
1890 .. Nicholson, John, *Chapeltown, Pudsey.*
— ... **Taylor, John W.,** *F.L.S., M.C.S., etc., Spring Bank, Horsforth, Leeds.*

RICHMOND DIVISION.

Pop. 54,439.

— ... **Carter, James,** *M.B.O.U., Burton House, Masham, viâ Bedale.*
1891 L. Carpenter, Hon. Mrs. [Beatrice], *Kiplin, Northallerton.*
1886 ... Chaytor, R. C., *M.C.S., Scrafton Lodge, Middleham, viâ Bedale.*
1890 ... Fawcett, George, *Thwaite, Swaledale, viâ Richmond, Yorkshire.*
1884 ... **Horne, William,** *F.G.S., Market Place, Leyburn, viâ Bedale.*
1885 ... Huddart, *Rev.* G. A. W., *M.A., LL.D., Kirklington Rectory, Bedale.*
1888 ... Peirse, *Sir* Henry Beresford, *Bart., J.P., Bedale Hall, Bedale.*
1890 ... Raine, Joseph, *Newbiggin, Richmond, Yorkshire.*
1888 ... Scrope, Simon Thomas, *J.P., D.L., Danby Hall, Bedale.*
1890 ... Spencer, Thomas, *The Terrace, Richmond, Yorkshire.*
1884 ... Taylor, *Rev.* Richard Vickerman, *B.A., Melbecks Vicarage, viâ Richmond, Yorkshire.*

RIPON DIVISION.

Pop. 54,925.

1883 ... **Backhouse, James,** *F.Z.S., M.B.O.U., Renoso, Victoria Avenue, Harrogate.*
1886 ... Clarkson, W. C., *L.R.C.P., etc., Darley, Ripley, viâ Leeds.*
1887 ... **Fortune, Riley,** *F.Z.S, Ravensgill, Franklin Mount, Harrogate.*
1887 ... Farrah, John, *Crescent Road, Low Harrogate.*
1894 ... Farrar, Abraham, *Junr., F.G.S., The Grange, Beech Grove, Harrogate.*
1894 ... Garrod, *Rev.* George Watts, *B.A.*, 11, *Crescent Parade, Ripon.*
1893 ... Goode, C. N., *Cotswold, Duchy Road, Harrogate.*
1889 ... Hancock, *Rev.* W. E., *M.A., Vicarage, Knaresborough.*
1891 ... Heslington, Thos. Clarke, 2, *North Road, Ripon.*
1891 ... Holtby, Alfred Charles, *Heaton House, Boroughbridge, York.*
1883 ... Hurst, Joseph S., *J.P., Copt Hewick Hall, Ripon.*
.. ... Ingleby, James, *Eaveston, near Ripon.*
1893 ... Johnston-Lavis, H. J., *M.D., M.R.C.S., B.ès Sc., F.G.S., etc., Professor of Vulcanology in the Royal University of Naples*; 7, *Chiatamone, Naples, Italy* (*Nov.* 1*st to May* 19*th*); 5, *Prince's Square, Harrogate* (*June* 15*th to Oct.* 1*st*).
.. ... Jowitt, Mrs. Hannah, *Thornton Grove, Ripley, Leeds.*
1889 ... King, John, *Grove Villa, Franklin Road, Harrogate.*
— L. **Knubley,** *Rev.* **E. Ponsonby,** *M.A., M.B.O.U., Staveley Rectory, viâ Leeds.*
1891 .. Laycock, Thomas, jun., *Deepdene, Franklin Road, Harrogate.*
1889 ... Lofthouse, J. H., 42, *Mayfield Grove, Harrogate.*
1891 ... McLean, Kenneth, *Studley Terrace, Harrogate.*
1891 ... Millward, Adam, *Cambridge Crescent, Harrogate.*
1886 ... Naughton, John, *Ellesmere School, Park View, Harrogate.*
1883 ... **Paver-Crow, Richard,** *J.P., Ornhams Hall, Boroughbridge, York.*

1884 ... Peach, Robert, *North Park Road, Harrogate.*
1889 ... Pickard, Isaac, *North Park Road, Harrogate.*
... Ripon, *The Most Hon.* George Frederick Samuel Robinson, *Marquis of, K.G., F.R.S., etc., Studley Royal, Ripon.*
1885 ... Radcliffe, *Sir* J. Percival, *Bart., F.R.A.S., Rudding Park, Knaresborough.*
1883 ... Saynor, John, *Woodside, Lancaster Road, Harrogate.*
1888 ... St. Paul, *Major* Horace, *J.P., The Willows, Ripon.*
1894 ... Scarfe, *Miss*, 84, *Franklin Road, Harrogate.*
1894 ... Scharff, W. E., *M.C.S., Hill Crest, Ripon Road, Harrogate.*
1893 ... Stephenson, *Miss* L. W., 6, *Beech Grove, Harrogate.*
1893 ... Stevenson, Tom, *North Stainley Hall, near Ripon.*
1891 L. Stobart, William C., *J.P., Spellow Hill, viâ Leeds.*
— ... **Summerfield**, *Rev.* **R. A.**, *B.A., North Stainley Vicarage, near Ripon.*
1884 ... Travis, *Rev.* William Travis, *M.A., The Rectory, Ripley, viâ Leeds.*
1893 ... Warwick, John Walton, 15, *East Parade, Harrogate.*
1893 ... Waldby, Joseph R., 3 *and* 5, *Crescent Road, Low Harrogate.*
1883 ... Woodd, Basil Thomas, *J.P., D.L., Conyngham Hall, Knaresborough.*

Rotherham Division.

Pop. 78,597.

1884 ... **Bennett, Samuel H.**, *Boston Grove, Rotherham.*
1884 ... Eskholme, George, *J.P., Beech-en-Hurst, Rotherham.*
— ... Payne, Henry, *M.D., Newhill Hill, West Melton, viâ Rotherham.*

Scarborough Borough.

Pop. 33,776.

1893 ... Barker, Reginald H., *Grosvenor Bank, Scarborough.*
1892 ... Chapman, John G., *Chapman's Hotel, Scarborough.*
1892 L. Clarke, William James, 44, *Huntriss Row, Scarborough.*
1894 ... Grabham, Oxley, *M.A., Croxton Villa, Grosvenor Road, Scarborough.*
1892 ... Hudson, George, *M.D., Westbourne House, Scarborough.*
1890 ... **Phillips, John H.**, 22, *Albemarle Crescent, Scarborough.*
1892 ... Read, E. W., *B.A., F.G.S., Oliver's Mount School, Scarborough.*
1889 ... Rowntree, Allen, 5, *Beulah Terrace, Scarborough.*
— L. **Rowntree, James Henry**, *Westwood, Scarborough.*
1892 ... Rowntree, William, *J.P., Westwood, Scarborough.*
1888 ... **Woodall**, *Major* **John W.**, *M.A., J.P., F.G.S., etc., St. Nicholas House, Scarborough.*

Sheffield City.

Pop. 324,243.

1884 ... **Birks, Edward**, *Birchcliffe, Broomhall Park, Sheffield.*
1884 ... **Brittain, Frederick**, *Melbourne Avenue, Sheffield.*
1892 ... Brittain, *Ald.* W. H., *J.P., Storth Oaks, Ranmoor, Sheffield.*
1884 ... Colley, Francis H., *Sharrow, Sheffield.*
1893 ... Coombe, John Newton, *Broces Bank, Sheffield.*
1885 ... **Denny, Alfred**, *F.L.S., Professor of Biology in the Firth College,* 1, *Broomgrove Crescent, Sheffield.*
1891 ... Doncaster, Edwin D., *Green Bank, Broomhall Park, Sheffield.*
1889 ... **Hall, A. E.**, *F.E.S., Norbury, Pitsmoor, Sheffield.*
1889 ... **Howarth, Elijah**, *F.R.A.S., Curator of Sheffield Public Museum, Weston Park*; 169, *Northumberland Road, Sheffield.*
1894 ... Parker, George William, 92, *Nether Edge Road, Sheffield.*
1892 ... Sheffield Central Public Free Library.
— ... **Sorby, Henry Clifton**, *LL.D., F.R.S., F.L.S., F.G.S., F.R.M.S., etc., Broomfield, Sheffield* (*Ex-President*).
1815 ... **Watson, Arnold Thomas**, *Southwold, Tapton Crescent, Sheffield.*
1893 ... White, William, *F.E.S., Curator, the Ruskin Museum, Sheffield.*
1890 ... Wilson, H. J., *M.P., Osgathorpe Hills, Sheffield.*
1894 ... Young, J. J. Baldwin, *B.A., Richmond Park, near Sheffield.*

SHIPLEY DIVISION.
Pop. 62,166.

SKIPTON DIVISION.
Pop. 58,209.

— ... **Eddy, J. Ray**, *F.G.S., F.R.M.S., The Grange, Carleton, Skipton.*
1887 ... Handley, John, *Briggflatts, Sedbergh, R.S.O.*
1892 ... Lindley, W. E., *Hothfield Terrace, Skipton.*
1887 ... Mackie, *Rev.* John H., *M.A., Sedbergh School, Sedbergh, R.S.O.*
1883 ... Morrison, Walter, *J.P., Malham Tarn House, Bell Busk, viâ Leeds.*
1893 ... Peake, Edward, *M.A.*, 12, *Craven Terrace, Settle.*
— ... **Richardson, Hugh**, *M.A., Sedbergh School, Sedbergh, R.S.O.*
1894 ... Rickards, C. A., *Bell Busk, viâ Leeds.*
1887 ... Robinson, William, *Green Bank, Sedbergh, R.S.O.*
— ... Shuffrey, *Rev.* W. A., *M.A., Halton Gill Vicarage, Arncliffe, via Skipton.*
1891 ... Thompson, *Miss* Rachael Ford, *Castle Hill House, Settle.*
1886 ... **Thompson**, *Rev.* **Wm.**, *M.A., J.P., Guldrey Lodge, Sedbergh, R.S.O.*
1893 ... **Tiddeman, R.H.**, *M.A., F.G.S., The Bailey Cottage, Skipton* (*President-Elect*).
1892 ... Wilkinson, J. J., *Burnside, Skipton.*
1890 L. Wright, C. B. E., *J.P., Bolton Hall, Clitheroe.*

SOWERBY DIVISION.
Pop. 63,202.

1886 ... Copley, Walter, *Clough Terrace, Sowerby Bridge.*
1894 ... Needham, James, *Woodend, Hebden Bridge.*
1894 ... Saltonstal, Thomas, *Sowerby, near Halifax.*
— ... Rawson, F. G. S., *Thorpe, near Halifax.*

SPEN VALLEY DIVISION.
Pop. 57,402.

— ... Blakeley, John Wesley, *Huddersfield Road, Liversedge.*
1891 L. Cooke, James S., *J.P., F.R.A.S., Norcott, Liversedge, viâ Normanton.*
1890 ... Foster, *Rev.* F. Barham, *B.A., The Vicarage, Birkenshaw, viâ Leeds.*
— ... **Fowler**, *Rev.* **William**, *M.A., Vicarage, Liversedge, viâ Normanton* (*Ex-President*).
— ... Hindley, A. D., *Liversedge, viâ Normanton.*
1891 ... Hutchinson, W. B., *F.R.A.S., A.I.E.E., The Observatory, Liversedge, viâ Normanton.*
1891 ... Niven, George H., *Northgate House, Cleckheaton.*
1893 ... Rothery, Albert, *South Holme, Liversedge, Normanton.*
— ... **Stead, John James**, *Albert Cottage, Heckmondwike.*

STOCKTON-ON-TEES BOROUGH.
Pop. 15,640.

THIRSK AND MALTON DIVISION.
Pop. 57,183.

— ... **Addison**, *Rev.* **Frederick**, *M.A., Sutton Road, Thirsk.*
1890 ... Buchanan, John Hamilton, *M.D., Sowerby, Thirsk.*
1890 L. Carlisle, *Right Hon. Earl of, J.P., Castle Howard, York.*
— ... **Chadwick, Samuel**, *F.G.S., Mount Pleasant, Malton.*
— ... **Foggitt, William**, *South Villa, Thirsk.*
1888 ... Fitzwilliam, *Hon.* W. H. Wentworth, *M.P., The Lodge, Malton.*
1883 H.L. **Gallwey**, *Sir* **Ralph Payne**, *Bart., M.B.O.U., Thirkleby Park, Thirsk.* (*Ex-President*).
— ... **Gregson, William**, *F.G.S., Baldersby, S.O., Yorkshire.*
— ... Hodgson, William, *Wheelgate, Malton.*
1890 ... Jones, George Fowler, *Quarrybank, Malton.*
1889 ... Longster, Thomas Piper, *Mowbray Terrace, Malton.*
1884 ... Mitchell, T. Carter, *F.S.A., Topcliffe, near Thirsk.*
— ... Pearson, Hugh W., *Castle Howard Road, Malton.*

— ... **Slater, Matthew B.**, *F.L.S.*, 84, *West Grove Villas, Newbiggin, Malton.*
1892 H.L. **Spruce, Richard**, *Ph.D., A.L.S., F.R.G.S., Coneysthorpe, Malton.*
1889 ... Suddaby, W. M., *Crown Hotel, Wheelgate, Malton.*
1888 ... Walker, A. W., *York and East Riding Bank, Malton.*
— ... Wright, John, *Terrington, viâ York.*

WAKEFIELD CITY.

Pop. 37,269.

1891 ... Ianson, G. G., *Northgate, Wakefield.*
1892 ... Parke, George Henry, *F.L.S., F.G.S., St. John's, Wakefield.*
— ... **Parkin, George**, 15, *York Street, Wakefield.*
1889 H.L. **Wakefield**, *The Right Rev.* **William Walsham-How**, *D.D., etc., Lord Bishop of, Bishopgarth, Wakefield.*

WHITBY DIVISION.

Pop. 54,776.

1889 ... Atkinson, Thomas, 7, *Normanby Terrace, Whitby.*
— ... **Braim, John**, *Hungate, Pickering, Yorkshire.*
— ... Colby, George, *Brawby Park, Pickering.*
1890 ... Foster, John Machell, *Burgate House, Pickering.*
1889 ... Fletcher, William, *Post Office, Pickering.*
1892 ... Hebden, Mrs. Emmeline, *Red House, West Ayton, York.*
— ... **Hey**, *Rev.* **William Croser**, *M.A., M.C.S., Derwent House, West Ayton, Seamer, York.*
1890 ... Hodgson, Thomas, *Burgate, Pickering.*
1889 ... Lucy, Charles T., *York Union Bank, Pickering.*
1886 ... Lightfoot, *Rev.* Geo. H., *M.A., The Vicarage, Pickering.*
1889 ... **Mitchelson, Thomas**, *The Mount, Pickering.*
1885 ... **Newbitt, Thomas**, 17, *Royal Crescent, West Cliff, Whitby.*
1884 ... Prodham, Herbert, *Allerston, near Pickering.*
1887 ... Pyman, Walter H. S., *Moss Brow, Whitby.*
1888 ... Smith, Christopher W., *Harome, Nawton, viâ York.*
1889 ... Stevenson, John, *J.P., Broomfield Terrace, Whitby.*
1889 ... Stewart, John T., 3, *Belle Vue Terrace, Whitby.*
1889 ... Wheldon, John Wm., *Burgate, Pickering.*

YORK CITY.

Pop. 67,004.

1893 ... Bean, Eugene, 8, *Nessgate, York.*
— ... **Clark, James Edmund**, *B.A., B.Sc.*, 12, *Feversham Terrace, York.*
1892 ... Creaser, William, 9, *Feversham Terrace, York.*
1889 ... Dacre, Hubert, 5, *Park Grove, York.*
— ... **Dennis, George C.**, 11, *Tower Street, York.*
1893 ... Dutton, Robert, *Castle Mills Bridge, York.*
1893 ... Elmhirst, Charles E., 17, *Mount Parade, York.*
1888 ... Gibb, George S., *LL.B., Chestnut Grove, Heworth, York.*
— ... Hewett, William, 12, *Howard Street, Fulford Road, York.*
1889 ... Hodsman, George, 8, *Feversham Terrace, York.*
— ... **Jackson, George**, 2, *Clement Street, York.*
1893 ... Mackay, Donald S., 4, *Lendal, York.*
— ... **Moiser, Henry R.**, *F.G.S., Heworth Grange, York.*
1890 ... Procter, John William, *Ashcroft, York.*
1893 ... Potter, Ernest Guy, 19, *Price Street, York.*
1884 ... Thompson, Richard, *Dringcote, York.*
1887 ... **Walker, Samuel**, 23, *Portland Street, York.*
1890 ... Walker, John Francis, *M.A., F.G.S., F.L.S., F.C.S., F.I.C., F.Z.S., etc.*, 45, *Bootham, York.*
1893 ... Wilkinson, Arthur, 39, *East Mount Road, York.*
1893 ... Wilkinson, Henry J., 11, *Chapter House Street, York.*

DURHAM, NORTHUMBERLAND, CUMBERLAND, WESTMORLAND, CHESHIRE, LANCASHIRE, AND ISLE OF MAN.

1890 ... Bacon, J. Cæsar, *Seafield, Santon, Isle of Man.*
— ... **Birks, Thomas, jun.**, *Moss Lodge, King's Road, Rochdale.*
1886 ... **Brownridge, Chas.**, *Assoc.M.I.C.E., F.G.S.*, 26, *North Road, Devonshire Park, Birkenhead.*
1891 ... Collins, Francis Richard, 88, *Mill Street, Crewe.*
1883 ... Darbishire, R. D., *B.A., F.S.A., F.G.S., Victoria Park, Manchester.*
1894 ... Foggitt, John B., 29, *Nevill Street, Southport.*
1884 ... Fox, *Rev.* Henry E., *M.A., M.B.O.U.*, 12, *South Bailey, Durham.*
1885 ... **Gardner, John**, *F.E.S.*, 8, *Friar Terrace, Hartlepool.*
1887 ... **Gerrard, John**, *H.M. Inspector of Mines, Worsley, Manchester.*
1883 ... **Hick, Thomas**, *B.A., B.Sc., Owens College; Brighton Grove, Rusholme, Manchester.*
1892 ... Howse, Richard, *Curator of the Newcastle Museum, and Hon. Sec. Tyneside Nat. Field Club*, 12, *St. Thomas Crescent, Newcastle-on-Tyne.*
1888 ... **Leach, Richard Ernest**, *M.A., F.G.S., Grammar School, Appleby.*
1890 L. Lees, Edward B., *J.P., Thurland Castle, Kirkby Lonsdale.*
1890 L. Marshall, Arthur, *Hallsteads, Penrith.*
1894 ... Melvill, James Cosmo, *M.A., F.L.S., etc., Brook House, Prestwich, Manchester.*
1894 ... Petty, Lister, *Bortree Stile, Ulverston.*
1883 ... Richmond, *Right Rev.* J. J. Pulleine, *D.D., Bishop of, Stanhope Rectory, viâ Darlington.*
1890 ... **Spiers**, *Rev.* **William**, *M.A., F.G.S., F.R.M.S., Hawthornden, Ramsey, Isle of Man.*
1889 ... Trechmann, Chas. O., *Ph.D., F.G.S., Hudworth Tower, Castle Eden, Durham.*
1890 ... Waddington, Robert, *Haslingden, Lancashire.*
1887 ... Watts, *Rev.* A., *F.G.S., F.R.G.S., The Rectory, Witton Gilbert, Durham.*
1890 ... Waud, Henry, *The Gardens, Brinkburn, Darlington.*

COUNTIES SOUTH OF YORKSHIRE.

— ... Barnes-Lawrence, *Rev. Canon* H. F., *M.A., C.M.Z.S., Beech House, Brookside, Cambridge.*
... H.L. **Baker, John Gilbert**, *F.R.S., F.L.S., The Royal Herbarium, Kew* (*Ex-President*).
1885 ... Bidwell, Edward, *M.B.O.U., Fonnereau House, Twickenham, Middlesex.*
— ... Beaumont, Alfred, *F.E.S., The Red Cottage, Pond Road, Blackheath, London, S.E.*
— ... Butterfield, J. A., *B.Sc.*, 35, *Wrottesley Road, Plumstead, London, S.E.*
1890 L. Charlesworth, John B., *J.P., Stradsett Hall, Downham Market.*
1891 L. Champney, John E., *J.P., Reform Club, Pall Mall, London, S.W.*
1893 ... **Coe, Joseph**, *c/o Rev. R. S. Coe, Blacklock Villas, Sittingbourne, R.S.O., Kent.*
— ... **Cordeaux, John**, *M.B.O.U., Great Cotes, R.S.O., Lincoln.*
1885 H.L. **Dallinger**, *Rev.* **W. H.**, *LL.D., F.R.S., F.L.S., Pres. R.M.S., etc., Ingleside, Newstead Road, Lee, London, S.E.* (*Ex-President*).
1889 ... **Dresser, Henry Eeles**, *F.L.S., F.Z.S., etc., Topclyffe Grange, Farnborough, R.S.O., Kent* (*Ex-President*).
1883 ... **Dunning, Joseph William**, *M.A., F.L.S., F.Z.S., F.E.S.*, 4, *Talbot Square, London, W.*
1883 ... Gough, *Rev.* T., *B.Sc., F.G.S., King Edward VI. School, East Retford.*
— ... **Green, A. H.**, *M.A., F.R.S., F.G.S., etc., Professor of Geology in the University of Oxford*, 137, *Woodstock Road, Oxford.*
1894 ... Green, Unfield, *F.G.S., Tenter Street, Moorfields, London.*
1884 .. Grove, Edmund, *F.R.M.S., Norlington, Preston, Brighton.*
1887 ... Haigh, G. H. Caton, *Aber-iâ, Penrhyndeudraeth, Merionethshire; and Grainsby Hall, Great Grimsby, Lincolnshire.*
— ... **Harker, Alfred**, *M.A., F.G.S., Woodwardian Museum, and St. John's College, Cambridge; and* 3, *Park Avenue, Princess Avenue, Hull.*
1891 ... Harrison, Joseph H., *Porter Street, Staveley, Chesterfield, Derbyshire.*

1890 **L.** Hawkesbury, *Lord, Cockglode, Ollerton, Newark, Notts.*
1891 ... Holmes, H. S., *B.Sc., Training College, Carmarthen.*
1883 ... Hopkinson, John, *F.L.S., F.G.S., F.R.M.S., etc., The Grange, St. Albans, Herts.*
1884 .... **Hudleston, Wilfred H.**, *M.A., F.R.S., F.L.S., F.G.S., F.C.S., etc.*, 8, *Stanhope Gardens, London, S.W.* (*Ex-President*).
1891 ... Loosmore, *Mrs.* J., *Fern Bank, Eastwood, Notts.*
1890 **L.** Lilford, *Right Hon. Lord, F.L.S., etc., Lilford Hall, Oundle, Northamptonshire.*
— ... Mason, Philip Brooke, *J.P., F.L.S., F.E.S., M.C.S., etc., Trent House, Bridge Street, Burton-on-Trent.*
— ... **Massee, George E.**, *F.R.M.S.*, 41, *Gloucester Road, Kew, Surrey.*
1890 **L.** Newton, *Rev.* Canon Horace, *The Vicarage, Redditch.*
1883 ... Oldfield, George Wm., *M.A., F.E.S.*, 21, *Longridge Road, Earl's Court, London, S.W.*
1888 ... Oxley, *Rev.* W. H., *M.A., Petersham Vicarage, Surrey.*
— **H.L.** **Parsons, Henry Franklin**, *M.D., F.G.S.*, 4, *Park Hill Rise, Croydon, Surrey.*
1888 ... Painter, *Rev.* W. Hunt, *Brockton, near Shifnal, Shropshire.*
1893 . Petch, Tom, *B.A.*, 27, *Wisbech Road, King's Lynn.*
1893 **H.L.** **Seebohm, Henry**, *F.L.S., F.Z.S., M.B.O.U., etc.*, 22, *Courtfield Gardens, Cromwell Road, London, S.W.* (*President*).
— ... **Slater**, *Rev.* **Henry H.**, *M.A., F.Z.S., M.B.O.U., etc., Thornhaugh Rectory, Wansford, Northamptonshire.*
1889 ... Strickland, Walter W. [*Address unknown.*]
— ... Tindall, George, *High Street, Newmarket, Suffolk.*
— **H.L.** **Walsingham,** *The Right Hon.* **Thomas De Grey**, *Lord, M.A., F.R.S., F.L.S., Pres. E.S., etc., Merton Hall, Thetford, Norfolk*; *and Blubberhouses, Yorkshire* (*Ex-President*).
1888 ... Weetman, Henry, *F.Z.S., The Hawthorns, Little Haywood, Stafford.*
1890 ... Whitaker, J. A., *c/o E. C. Turner, Blakeney, Holt, R.S.O., Norfolk.*
— ... **Whitwell, William**, *F.L.S., M.C.S., Roslin*, 4, *Thurleigh Road, Balham, London, S.W.*
1890 ... Woodd, C. Hampden B., *M.A., Roslyn, Hampstead, London, N.*
1892 ... Wilson, T. Stacey, *M.D.; B.Sc.Ed., Wyddrington, Edgbaston, Birmingham.*
— **H,L.** **Williamson,** *Em.-Prof.* **W. C.**, *LL.D., F.R.S.*, 43, *Elms Road, Clapham Common, London.*

Scotland and Ireland.

— ... **Clarke, Wm. Eagle**, *F.L.S., M.B.O.U., Nat. Hist. Dept., Edinburgh Museum of Science and Art*, 35, *Braid Road, Edinburgh.*
1887 ... **Grimshaw, Percy H.**, *Nat. Hist. Dept., Edinburgh Museum of Science and Art*; 58, *Coniston Road, Edinburgh.*
1885 ... Harvie-Brown, John A., *F.R.S.E., F.Z.S., M.B.O.U., etc., Dunipace House, Larbert, N.B.*
1888 ... **Kidston, Robert**, *F.R.S.E., F.G.S.*, 24, *Victoria Place, Stirling, N.B.*
1887 ... More, Alexander Goodman, *F.R.S.E., F.L.S., M.R.I.A.*, 74, *Leinster Road, Dublin.*
1889 ... Scharff, Robert F., *Ph.D., B.Sc., M.R.I.A., etc., Curator of the Dublin Nat. Hist. Museum*, 22, *Leeson Park, Dublin.*

Foreign Countries.

— ... **Bairstow, Samuel Denton**, *F.L.S.*, 120, *Main Street, Port Elizabeth, Cape Colony.*
1890 ... LeTall, Benj. Bower, *M.A. Lond., Friends' School, Hobart, Tasmania.*
1888 ... **Waite, Edgar R.**, *F.L.S., Assistant Curator in the Australian Museum*, 43, *Barcorn Terrace, Darlinghurst, Sydney, New South Waies.*

Printed by McCorquodale & Co. Limited, Leeds.